FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

PROGRAM FOR RESEARCH ON NUTRITIOUS AND SAFE FOODS

The Feed the Future Food Security Innovation Center leads USAID's implementation of the Feed the Future Research Strategy through seven interlinked research, policy and capacity programs aimed at sustainably transforming agricultural production systems. Visit www.feedthefuture.gov/research to learn more.

The ***Program for Research on Nutritious and Safe Foods*** focuses on improving the production and safe processing of nutritious agricultural products and on increasing our understanding of the role of fruits, vegetables, meat, fish, dairy and legumes in improving household dietary quality.

The program puts special attention on improving nutrition in the first 1000 days of life, which are critical to a child's cognitive and physical growth and development. A number of studies link nutrition to a country's economic development, affecting individuals' health, educational success and future economic productivity. The economic loss attributable to undernutrition in low- and middle-income countries is estimated at 2-3 percent of GDP.

RESEARCH IN ACTION

Bangladesh Aquaculture-Horticulture for Nutrition Collaborative Research represents a Feed the Future research partnership among three Innovation Labs and two CGIAR Research Centers: Nutrition, Horticulture, and Aquaculture & Fisheries plus the International Potato Center (CIP) and WorldFish. Together, they will examine the impacts of different approaches linking agriculture, nutrition, health, and gender equality on dietary diversity, nutritional status, and whether programs to increase farmers' incomes result in improved nutrition.

Innovative technologies will be rigorously tested, including a new strategy for floating gardens on smallholder fish ponds, chimney dryers, and solar-powered cold rooms to extend the life of fresh fish, vegetables, and fruits. The results of this research will not only enhance the impacts of Feed the Future investments, but also provide a basis for greater cross-innovation lab and inter-program engagement on key scientific questions relevant to the global development community.

DID YOU KNOW?

- **In low-income countries worldwide, one third of all children under five years of age are stunted. A similar proportion of children are iodine-deficient, and half of all of children and pregnant women are anemic. Up to 50 percent of women and young children have inadequate diets of poor protein and micronutrient quality, contributing to undernutrition and mortality.**
- **The prevalence of stunting in a country is inversely correlated with availability of high-quality protein, especially animal-source proteins, which are 20-30 percent more digestible than plant proteins and contain higher, more bio-available levels of essential vitamins and minerals. Foods such as fish, meat and dairy products are important for nutrition, but they are relatively expensive and often unavailable to low-income households.**
- **Fruits and vegetables provide essential micronutrients, but are susceptible to many pests and diseases that reduce yields and increase post-harvest losses. Incorrectly applied pesticides can threaten human health and the environment; women and children are especially vulnerable.**
- **Mycotoxins are toxins made by molds (fungi) when they grow on cereals, grain legumes, peanuts and groundnuts, tubers, and animal feed, both in the field and during storage. Eating foods with mycotoxins, notably the varieties aflatoxin and fumonisin, can cause death or cancer. They can also disrupt gut function, leading to child stunting, low birth weight for babies and poor immune function.**

RESEARCH AREAS

Horticulture – This program aims to sustainably increase the production of highly nutritious fruits and vegetables and is closely aligned with horticulture value chain projects supported by USAID field Missions. Applied research includes breeding for pest and disease resistance and longer shelf-life; development of vegetable seed kits for home gardens, disaster relief and HIV patients; new technologies such as advanced solar driers and solar-powered cool rooms; post-harvest best practices and development of environmentally-friendly methods for control of pests and diseases. Underutilized "indigenous" vegetables are also being researched and promoted. Cross-cutting research themes are gender, nutrition and post-harvest loss reduction.

Aquaculture – Aquaculture is the fastest-growing food production sector worldwide. Fish contribute 40 percent of the animal-source protein consumed in developing countries, and it will be critical to increase production to meet the growing demand for high-quality protein and essential micronutrients. This program aims to develop more productive and efficient aquaculture systems and practices, and to reduce their negative environmental impacts by developing better and cheaper fish feeds, more efficient feeding practices, and improved feed conversion, especially in indigenous species.

Livestock and Dairy – Research in this area focuses on increasing livestock and household resilience to climate change by developing strategies to address the accelerating transmission of zoonotic diseases and parasites; declining forage and water resources that affect the quantity and health of animals for export or local markets; and the availability of animal-source foods for vulnerable populations.

Mycotoxins – This area focuses on improving the safety of staple foods by preventing and reducing mycotoxin contamination during production and post-harvest. Scale-neutral peanut processing techniques are being developed to reduce aflatoxin contamination in processed products. Research to develop mycotoxin-resistant crop varieties and biological control methods is underway in Asia and Africa. Operational research is being conducted on the relationship between aflatoxin intake and nutritional/health status.

Biofortified Crops – To increase the availability of critical micronutrients in commonly available foods, targeted breeding programs have developed a new variety of rice (Golden Rice), which is high in vitamin A. This biofortified commodity will be distributed in conjunction with nutrition education and social and behavioral change communication programs.

Nutrition – Nutrition research focuses on discovering how policy and program interventions can most effectively achieve improvements in maternal and child nutrition by leveraging agriculture, nutrition and health inputs at scale. Operational research in partnership with country institutions supports human and institutional capacity building for research and policy analysis, contributing to improved nutrition, health and agricultural productivity. Nutritional benefits of aflatoxin mitigation and co-location of aquaculture and horticultural production investments are also being researched.

Post-harvest Loss Reduction – This area of research focuses on reducing post-harvest losses throughout the value chain. Promising technologies for efficient drying and storage of crops are piloted and tested, as well as methods for the measurement of moisture and mycotoxins in stored food and seeds. Examples of technologies being tested include grain dryers, storage containers, moisture meters and mycotoxin detection methods. This work is coupled with food processing innovations and mechanisms of dissemination that link farmers to markets. Research on post-harvest loss is underway in Africa, Latin America and Souteast Asia.

PARTNERS

Universities – The U.S. university-led Feed the Future Innovation Labs provide long-term degree training to developing country students as well as training and capacity development for farmers, food processors, government officials, research institutions and universities. Collaborative research strengthens developing country partners through access to technologies and information, and creates scientific collaborations that last for decades.

Private Sector – Collaborative research and technology transfer to private firms build excellence in post-harvest and processing and improve the safety of food products. Small- and medium-scale enterprises in developing countries are often challenged by the expense and risk related to investments in research and development, but USAID's support for research in product and process development helps firms to invest in technology adaptation and scale-up.

International Institutions – International research organizations, especially member institutions of the CGIAR and the World Vegetable Center, bring vital agricultural research expertise to USAID's efforts in the production of food staples and vegetables, livestock and climate change, nutrition, and other areas, as well as links to national research centers in partner countries.

National Partners – National agricultural and nutritional research, education, and training organizations are important partners in addressing both productivity and utilization of high-quality foods. They develop innovations that respond to national needs and priorities, and provide essential local knowledge and capacity for guiding research and achieving sustainable solutions to problems.

Non-Governmental Organizations – NGOs work closely with USAID to implement program innovations and partner on research. These organizations provide significant expertise and outreach at the community level.

U.S. Government – As part of Feed the Future's whole-of-government approach, USAID partners with the U.S. Geological Service and U.S. Department of Agriculture in key areas such as livestock and climate change research and mycotoxin reduction.

RESEARCH IN ACTION

In Kenya, Tanzania and Zambia, an African indigenous vegetables project aims to increase incomes and enhance the nutrition of women and children by addressing critical production and marketing constraints for these highly nutritious yet underutilized vegetables. This unique research activity is led by the Feed the Future Innovation Lab for Collaborative Research on Horticulture in partnership with the World Vegetable Center and horticultural value chain projects of the respective USAID Missions.

After three years, the project has conducted research on 20 technologies that address identified constraints to production and marketing, and has transferred seven of these technologies so far to over 18,000 farmers, three quarters of whom are women, many belonging to vulnerable households. The project has also supported 11 graduate students at universities in the United States, South Africa, Kenya, and Tanzania. Increased production and wider availability of indigenous vegetables is expected to have especially positive impacts on HIV-affected beneficiaries in domestic markets who need to increase their consumption of nutritious foods in combination with anti-retro viral drug therapy. Smallholders in Kenya have also benefited from expanding export markets for processed indigenous vegetables.

Current Research Projects	Lead Institutions	Countries
World Vegetable Center (AVRDC): Core Support	AVRDC	Global
World Vegetable Center (AVRDC): Post Harvest Loss Project	AVRDC	Ghana, Kenya, Tanzania, Mali, Bangladesh, Nepal, Cambodia
Feed the Future Innovation Lab for Collaborative Research on Horticulture	University of California, Davis	Bangladesh, Cambodia, Guatemala, Ethiopia, Ghana, Honduras, Kenya, Rwanda, Uganda, Nepal, Tanzania, Zambia
Feed the Future Innovation Lab for Reduction of Post-Harvest Loss	Kansas State University	Ethiopia, Ghana, Guatemala, Bangladesh
Feed the Future Innovation Lab for Food Processing and Post-Harvest Handling	Purdue University	Kenya, Senegal
USDA/NBCRI – Aflatoxin Control in Maize and Peanut	USDA/Agricultural Research Service	Nigeria, Global
CGIAR Research Program – Livestock and Fish	International Livestock Research Institute	Global
Feed the Future Innovation Lab for Collaborative Research on Adapting Livestock Systems to Climate Change	Colorado State University	Ethiopia, Kenya, Nepal, Senegal, Mali, Tanzania
Feed the Future Innovation Lab for Collaborative Research on Aquaculture and Fisheries	Oregon State University	Bangladesh, Philippines, Cambodia, Vietnam, Nepal, Ghana, Kenya, Tanzania, Uganda
Collaborative Research in Aquaculture and Horticulture for Improved Nutrition	Tufts University	Bangladesh, Cambodia
CGIAR Research Program – Agriculture for Nutrition and Health	International Food Policy Research Institute	Global
Feed the Future Innovation Lab for Collaborative Research on Nutrition - Africa	Tufts University	Uganda, Malawi
Feed the Future Innovation Lab for Collaborative Research on Nutrition - Asia	Tufts University	Nepal
Golden Rice	International Rice Research Institute	Bangladesh, Philippines, Indonesia

Feed the Future Food Security Innovation Center

The Program for Research on Nutritious and Safe Foods links research on the production and processing of safe, nutritious agricultural products to a learning agenda on household nutrition, including the utilization of and access to fruits, vegetables, meat, fish, dairy and legumes with the goals of preventing undernutrition (especially in women and children), improving child survival and securing family investments in agriculture.

The Feed the Future Food Security Innovation Center leads USAID's implementation of the Feed the Future Research Strategy through seven interlinked research and capacity programs aimed at sustainably transforming agricultural production systems. It is housed within the Bureau for Food Security and is a strategically aligned and integral component of USAID's science and technology programs.

- **Research on Climate Resilient Cereals** – This program helps smallholder farmers adapt to climate change and build resilience by developing new cereal varieties with enhanced yield and tolerance to drought, heat, salinity and low soil fertility, and delivering these varieties in diversified, sustainable farming systems.

- **Research on Legume Productivity** – This program increases the production and consumption of critical, protein-rich legumes by developing disease- and stress-tolerant, high-yielding varieties, improving market linkages and post-harvest processing, and integrating legumes into major farming systems to improve household nutrition and incomes, especially for women.

- **Advanced Approaches to Combat Pests and Diseases** – This program harnesses U.S. scientific expertise and emerging molecular tools to develop new animal vaccines and crops and animals resistant to pests and diseases that cause significant production losses in tropical systems.

- **Markets and Policy Research and Support** – This program works to achieve inclusive agricultural growth and improved nutrition through research on enabling policies, socioeconomics and technology targeting, and by building the capacity of partner governments to effect sustainable change in areas such as land tenure, financial instruments, input policies and regulatory regimes.

- **Sustainable Intensification** – This program works with smallholder farmers to incorporate sustainable, productivity-enhancing technologies and farming practices into major production systems where the poor and undernourished are concentrated and, through intensification and diversification of these systems, to enhance resilience, nutrition and agricultural growth.

- **Human and Institutional Capacity Development** – This program strengthens individuals – scientists, entrepreneurs, educators – and institutions, ensuring that food and agriculture systems in developing countries are capable of meeting the food security challenge and that women in particular are poised to take advantage of new opportunities and provide critical leadership in agricultural research, private sector growth, policy development, higher education and extension services.

Questions? Contact FTFinnovation@usaid.gov