



FEED THE FUTURE

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



THE U.S. GOVERNMENT'S GLOBAL FOOD SECURITY RESEARCH STRATEGY

Executive Summary

Reducing Global Hunger, Malnutrition and Poverty
Through Science, Technology & Innovation

www.feedthefuture.gov



Front cover photo by Albert Opong-Ansah

Photo this page by Fintrac, Inc.

U.S. RESPONSE TO THE GLOBAL FOOD SECURITY CHALLENGE

Today, nearly 800 million people suffer from chronic hunger, and 2 billion suffer from micronutrient deficiency. A projected 702 million people still live in extreme poverty. Much of this poverty, hunger and malnutrition is concentrated in rural areas in developing countries, where the majority of people rely on agriculture for their livelihoods. And these challenges are likely to worsen in the years to come: The global population is expected to swell from 7.5 to 8.5 billion by 2030, and again to 9.7 billion by 2050, placing unprecedented pressure on food systems. Rising incomes will further increase demand for food—particularly foods, such as meat, that require more resources to produce. These changes, together with widespread environmental shifts and variability, will exert increasing pressure on the natural resources on which food production relies.

What will it take to adequately nourish 7.5 billion people in the short term, let alone almost ten billion in the decades to come? How will we accomplish this without degrading dwindling supplies of arable land, fresh water and other resources? And what are the consequences—to the United States, and to the world—if we fail to meet these challenges?

Addressing these issues lies at the heart of the U.S. Government's investments in global food security. In a world of increasingly integrated agricultural markets, where agricultural pests and diseases easily cross borders and persistent hunger abroad can have geopolitical consequences at home,

finding new and innovative ways to promote global food security does more than serve humanitarian goals; it is crucial to America's continued security and prosperity.

In response to this imperative, the United States Government launched the Feed the Future initiative to reduce global hunger, undernutrition and extreme poverty. Five years later, the U.S. reaffirmed these goals with the Global Food Security Act (GFSA) in July 2016. The GFSA called on the U.S. Government to collaborate with an array of partners to reduce global hunger, malnutrition and poverty, and explicitly called for U.S. investments to “harness science, technology and innovation.”



Photo by Bimala Rai Colavito, ENBAITA

To guide U.S. investments in food security, the GFSA also required the creation of the U.S. Government's Global Food Security Strategy (GFSS), to lay out in detail how the U.S. intends to fulfill the broad goals described in the GFSA. The GFSS, completed in October 2016, identified three overarching objectives to guide U.S. investments and programming of Feed the Future under the GFSA.

- Promote inclusive, sustainable, agriculture-led economic growth that reduces global poverty, hunger and undernutrition, particularly among women and children.
- Build resilience among vulnerable populations and households to food shocks while reducing reliance upon emergency food assistance.
- Improve nutritional outcomes, especially among women and children, with a focus on reducing child stunting, including through the promotion of highly nutritious, safe foods, diet diversification and nutritional behaviors that improve maternal and child health.

To achieve these objectives, the GFSS highlighted that research investments “ensure a pipeline of innovations, tools and approaches designed to improve agriculture, food security, resilience and nutrition priorities in the face of complex, dynamic challenges.”

In response, the U.S. Government's Global Food Security Research Strategy presented here seeks to bring U.S. ingenuity to tackle the greatest challenges in achieving sustainable, global reductions of poverty, hunger and malnutrition.

U.S. Government agencies that are part of the Feed the Future initiative developed this research strategy in 2017 to align research investments with the goals of the GFSA and GFSS.

RESEARCH STRATEGY AND THEMATIC RESEARCH AREAS

To bring U.S. scientific ingenuity to bear on the greatest challenges of global food security, this research strategy frames research programming in terms of a Research and Development (R&D) pipeline, in which new technologies advance through phases of basic, applied and adaptive research before being transferred to technology-scaling partners for dissemination and, ultimately, widespread adoption by developing-country beneficiaries.

To coordinate research efforts along this R&D and technology-scaling pipeline, this strategy focuses inquiry on three broad research themes. The first two themes call for development of scalable food security innovations:

I. Technologies and practices that advance the productivity frontier to drive income growth, improve diets and promote natural resource conservation.

II. Technologies and practices that reduce, manage and mitigate risk to support resilient, prosperous, well-nourished individuals, households and communities.

In addition to generating scalable technologies and practices that advance productivity and nutrition and mitigate risk in Feed the Future partner countries, research also increases understanding about how human behavior, the development context and the enabling environment influence progress of food-insecure households, communities and countries toward improved food security

outcomes. In turn, such knowledge is critical to guide the prioritization, design and implementation of Feed the Future programming. This provides the basis for the third major theme of this strategy:

III. Improved knowledge of how to achieve human outcomes: Generating evidence on how to sustainably and equitably improve economic opportunity, nutrition and resilience.

Together, these three research themes provide a pipeline of innovative, scalable products and practices to improve agriculture-led growth, resilience and human nutrition in Feed the Future partner countries—along with accompanying contextual information to optimize the adaptation and scaling of research outputs in the partner-country context, promote effective development programming, and ultimately drive food security outcomes.

Progress to Date

The U.S. Government made substantial strides in bridging the gap between agricultural research outputs and global food security impacts. Between 2011 and 2016, Feed the Future has helped develop and deploy over 900 innovations and is advancing a pipeline of 50,000 innovations to meet dynamic and sometimes unforeseen changes that impact food security.



Working with the Private Sector

The U.S. private sector is a crucial partner in supporting, generating and scaling food security innovations. The domestic coffee industry, responsible for nearly 1.7 million American jobs and \$225 billion of U.S. Gross Domestic Product, is almost entirely dependent on overseas production. To ensure a steady supply of the coffee on which the industry depends, U.S. coffee companies work closely with USAID to assist the world's many at-risk coffee producers. These efforts span three continents, 19 countries, and include U.S. companies such as J.M. Smucker, Keurig Green Mountain and Starbucks, as well as American institutions like Root Capital, Texas A&M University and World Coffee Research. Together, these partners implement market-oriented development efforts to help farmers connect to regional and international traders; boost productivity; improve quality control; and certify their plantations so they can meet international standards and compete in global markets. But in addition to these development interventions, this public-private partnership acknowledges the crucial role of research in protecting sustainable long-term coffee production by including a research component to combat emerging pests and diseases such as the antestia beetle outbreak in Rwanda and the global threat of coffee leaf rust.

This generates substantial dual benefits, for both developing-country farmers and the U.S., as coffee is not only a popular beverage consumed by one-third of the world's population; it is also a critical source of income for some 25 million small-scale farmers in developing countries. By investing in efforts that help smallholder coffee producers in Africa, Latin America, the Caribbean and Asia sustainably boost their productivity and incomes—complemented by research to help sustain these gains in the face of emerging agricultural pests and disease—this public-private partnership transforms lives and supports thousands of U.S. jobs in the process.

Photo by USAID-ACCESO/Fintrac Inc.

How Does It Work?

Research moves through three stages of development before outputs are handed off to technology-scaling partners for dissemination and, ultimately, widespread adoption. For example, U.S. Government funding has accelerated the application of genetic research to develop improved maize varieties that advance food security in Feed the Future partner countries.

1 BASIC RESEARCH

The National Science Foundation and USDA supported development of a novel genotyping technology to quickly identify useful genes in plants.



2 APPLIED RESEARCH

USAID funded researchers from international agricultural research centers, U.S. universities and Feed the Future partner countries to apply this technology to breeding high-yielding and heat-tolerant maize. Without this new technology, the process would typically have taken 10 years; with it, it took only three years.



3 ADAPTIVE RESEARCH

Researchers quickly developed high-yielding, heat-tolerant maize that outperformed some of the best commercial varieties in local environments in India, Nepal, Bangladesh and Pakistan.



4 TECHNOLOGY SCALING

Improved maize varieties have been handed off to private seed companies, which are commercializing them for dissemination to smallholder farmers in these four countries. (Improved varieties were also shared with U.S. maize breeding programs, to help improve domestic yields.)



5 BUILDING GLOBAL FOOD SECURITY

Smallholder farmers around the world, including U.S. farmers, will be able to grow more and better maize to boost food security.





Photo by Hector R. Santos, USAID

ORGANIZING PRINCIPLES FOR U.S. FOOD SECURITY RESEARCH PARTNERSHIPS

Many U.S. Government agencies make critical contributions to the three research themes of this research strategy—although they operate at different stages of the food security R&D pipeline, with different partners and stakeholders, and in accordance with distinct agency mandates.

To ensure the collective impact of food security investments, U.S. research funding agencies, U.S. partner agencies and departments under the Feed the Future initiative, and their respective partners should coordinate closely to ensure that promising innovations efficiently transit through the R&D pipeline, are applied to priority challenges in global food security, and respond to feedback from partner-country stakeholders and beneficiaries.

To support improved coordination, the strategy details the roles of key U.S. and international partners in designing, supporting, implementing and scaling research outputs.

To facilitate coordination and maximize impact of collective food security research

and development efforts across this diverse group of partners, the following core operating principles will guide implementation:

- Embrace purpose-driven research.
- Strengthen agricultural innovation systems.
- Orient research efforts to support technology scaling.
- Promote empowerment and equitable participation in science.
- Leverage data to accelerate research.
- Generate and sustain global public research goods.
- Continuous learning, adaptation and communication through monitoring and evaluation.

THE CASE FOR INVESTMENT

Research today enables global food security tomorrow. Overcoming the world's food security challenges requires the kind of revolutionary breakthroughs that nourish billions and transform markets—new innovations on the scale of Norman Borlaug's Green Revolution, which propelled much of Asia from food crisis to food sufficiency. But although such breakthroughs can seem singular in hindsight, in truth they emerge

from long years of incremental scientific advancement, and must be maintained by continual research to protect hard-won productivity gains from a constant barrage of emerging threats to food security.

For innovation to benefit global food security requires sustained, long-term research investment to maintain a continual pipeline of maturing technologies with the potential to address current, near-term and long-term threats and opportunities. The case for such investment is strong: publicly funded agricultural research and development has historically delivered rates of return between 30-40 percent, among the highest of any public investment.

In the coming decades, innovation will be all the more critical to achieve and maintain food security gains in the face of complex global challenges such as a growing population, changing consumer demands, shifting climate patterns, evolving pests and diseases and violent conflict.

Evidence indicates that research investments:

- Enable the productivity gains that drive global improvements in food security.
- Protect against tomorrow's food security risks—at home and abroad.

RESEARCH IN ACTION

The Feed the Future Innovation Lab for Assets and Market Access, led by the University of California, Davis, working with the International Livestock Research Institute, designed and tested a livestock insurance product which uses satellite data to generate an index for grazing conditions. Payments are triggered when conditions degrade below a certain critical level, eliminating the need for insurance agents to make field visits. Using this model, the Government of Kenya developed their own Kenyan Livestock Insurance Programme (KLIP). As of February 2017, KLIP paid over 12,000 pastoral households an average US\$170 to protect their livestock assets from the impacts of drought.

According to Willy Bett, Cabinet Secretary for Kenya's Ministry of Agriculture, Livestock and Fisheries: "This is the biggest livestock payment ever made under Kenya's agricultural risk management program and the most important as well, because without their livestock, pastoralist communities would be devastated. It's also a way to ensure that pastoralists can continue to thrive and contribute to our collective future as a nation."



Photo by CNFA

WHO IS CONTRIBUTING?

In addition to USAID and USDA, which are Feed the Future partner agencies, other U.S. Government partners contribute to the different stages of the research process to develop technologies and innovations that smallholder farmers and food producers around the world can use to help boost food security and nutrition.

Whether generating fundamental scientific tools, applying them to global food security challenges, or scaling new innovations to

generate global impact, these partners are playing a critical role in helping the U.S. build a more stable, food-secure world through science and innovation.

FUNDING AGENCIES

- USAID
- USDA
- The National Institute of Health
- The National Science Foundation
- The U.S. Department of Energy

Aligned investment from other research funding organizations amplifies the impact of foundational U.S. Government research investments. U.S. food security research investments leverage complementary support from a wide range of public and private entities.

LOOKING AHEAD

In the face of pressing global food security challenges, the U.S. research community's unparalleled scientific and technological capacity has the potential to support sustainable reductions in global poverty, hunger and malnutrition. Cooperation across U.S. Government research funding agencies and Feed the Future partner agencies and departments is required to achieve impact.

The participation of key partners and stakeholders in the United States and in partner countries—including the private sector; other international and philanthropic donors, partner country governments and civil society, is also key to success. Together, these partnerships will promote development of sustainable systems to generate the type of innovations that will help build a food-secure future and more stable world.

To download the full U.S. Government's Global Food Security Research Strategy, go to www.feedthefuture.gov/research.



Photo by Zahur Ramji (AKDN)



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