



THE NEXT
150

STRATEGIC TASK FORCE AREA REPORT

Food Security Strategy Task Force

15.JANUARY.2018



Table of Contents

- I. TASK FORCE CHARGE..... 3
- II. TASK FORCE MEMBERSHIP 4
- III. EXECUTIVE SUMMARY..... 5
- IV. CHARGE QUESTIONS AND RESPONSES..... 7
 - A. AREAS FOR ILLINOIS GREATEST OPPORTUNITIES 7
 - B. STATUS, OPPORTUNITIES & CHALLENGES 9
 - 1. Education Status, Opportunities, and Challenges..... 9
 - 2. Research Status, Opportunities, and Challenges 13
 - 3. Engagement Status, Opportunities, and Challenges..... 19
 - C. SPECIFIC ACTIONS IN EDUCATION, RESEARCH, AND ENGAGEMENT.... 23
 - D. WAYS TO LEVERAGE RESEARCH STRENGTHS..... 26
 - E. WAYS TO ENGAGE COMMUNITY..... 26

I. TASK FORCE CHARGE

On November 16, 2017, the Food Security Strategy Task Force (FSSTF) was formed to contribute to a comprehensive strategy for growth and development of food security research, education, and engagement at the University of Illinois. Chancellor Jones and Interim Provost Wilkin charged this committee, directed by Alex Winter-Nelson and consisting of 17 faculty members across five colleges and one school, to explicitly address the following:

- In what areas does Illinois have the greatest opportunity to positively impact state, national and global food (in)security through research, education and engagement?
- What opportunities and challenges do we face in food (in)security-related research and education over the next five to ten years?
- What specific actions would be most effective in realizing our potential in food (in)security education, research and engagement? What new investments would be necessary to implement those actions? Please distinguish short-(24 months), medium-(3-5 years), and long-term horizons (5-10 years) for the actions.
- How can we better leverage our research strengths to enhance the university's educational mission in food (in)security-related fields?
- The area of food (in)security presents many opportunities for community engagement. How can we best engage our local community through the food security?

The charge letter invited the Task Force to "consider additional questions to help guide the development of multiple strategies for food (in)security at our institution." The charge requested the Task Force "develop, at the outset of your efforts, a process for engaging key internal and external stakeholders and drawing on the diversity of disciplinary expertise on the campus."

II. TASK FORCE MEMBERSHIP

Chair, Alex Winter-Nelson, Agricultural and Consumer Economics, College of ACES

Richard Akresh, Economics, College of LAS

Brian Dill, Sociology, College of LAS

Brenna Ellison, Agricultural And Consumer Economics, College of ACES

Barbara Fiese, Human Development and Family Studies, College of ACES

Paolo Gardoni, Civil and Environmental Engineering, College of Engineering

Richard Gates, Agricultural and Biological Engineering, College of ACES/Engineering

Craig Gundersen, Agricultural and Consumer Economics, College of ACES

Kristin Hoganson, History, College of LAS

John "Jack" Juvik, Crop Sciences, College of ACES

Prasanta Kalita, Agricultural and Biological Engineering, College of ACES

Michelle Nelson, Advertising, College of Media

Shelly Nickols-Richardson, Food Science and Human Nutrition, College of ACES

Jesse Ribot, Geography and GIS, College of LAS

Hans Stein, Animal Sciences, College of ACES

Sarah Williams, University Library

Matthew Winters, Political Science, College of LAS

III. EXECUTIVE SUMMARY

The persistence of food insecurity in our community and around the world presents a grand challenge that universities have the capacity and responsibility to address. Achieving food security calls for expertise from a diverse set of disciplines and capabilities across the missions of education, research, and public engagement. The University of Illinois (U of I) is among a small set of institutions that offers the disciplinary breadth and excellence to address the complexity of food security research and to translate discovery into impact through education and public engagement.

The U of I has been working to ensure people's access to sufficient, safe and nutritious food since its establishment in 1867. We already offer highly rated curricular programs with relevance to food security. We have a substantial presence in food security research, with significant impacts emerging from disciplinary and interdisciplinary efforts. Our engagement initiatives from UI Extension and other units have significantly advanced food security in our own community and across the globe.

As challenges to food security continue to emerge as matters of local, state, and global concern, we need to grow our efforts in this endeavor rather than to retreat. To expand our impact in addressing the problem of food insecurity we need a more concerted approach. Improved coordination offers the chance to link humanistic and social science enquiry on the causes and nature of food insecurity to more scientific, technical, and applied veins of research; to further integrate research in agricultural sciences with health sciences, data science, and other scientific fields; to approach large-scale food security challenges with insights derived from community and area studies expertise; to enrich education with experiential and cross-disciplinary learning; and to magnify engagement activities by drawing the whole campus into a collective effort to address food insecurity. The challenges to expanding interdisciplinary, problem-oriented education, research, and engagement can be addressed by identifying food security as a campus-wide priority, hiring strategically, and establishing a campus unit to support and coordinate activities related to food security.

To increase the impact of our activities in food security, the U of I can:

1. **Expand faculty and staff capacity in food security** through targeted hiring combined with funding to coordinate food security efforts. This expansion should build on existing strengths and fill critical gaps in promising areas.
2. **Establish a campus-based institute (Illinois Food Security Institute, IFSI)** to develop and coordinate efforts in education, research, and engagement. By establishing a food security institute, the campus would create a focal point for

stimulating work on food security that integrates across disciplines and our critical missions.

3. Within the institute, **establish a Food Security Experiential Education program.** This program would make food security-related experiential and service learning opportunities more accessible and more meaningful. The office would promote experiential learning activities through a Food Security Scholars program, a Certificate in Global Food Security, support for new course development aimed at raising awareness of a broad array of food-security issues, and support for undergraduate and graduate research.
4. Within the institute, **establish an Integrative Food Security Research program.** This arm of IFSI would build linkages among scholars on campus, support thematic workshops and other activities, and provide seed funding for interdisciplinary research that engages the public and our students.
5. Within the institute, **establish a Food Security Resource Center.** This Center would be an outreach hub, providing a public engagement access point for the campus and community. It would coordinate the multiple food security-related engagement activities of the campus, from efforts to ensure food security within the campus community to action-oriented activities abroad. It would provide a clearinghouse of opportunities, a forum for dialogue among researchers and practitioners, and an incubator for campus-based engagement.

A campus-level program on food security could be impactful through innovative research and engagement, while providing a theme that relates to the wellbeing of everyone in our diverse student body. The essential nature of food means that food security initiatives can appeal to students from diverse backgrounds, can raise their understanding of the experiences of people very different from themselves, and can provide a mechanism through which they experience how the university uses knowledge to address social challenges.

IV. CHARGE QUESTIONS AND RESPONSES

A. AREAS FOR ILLINOIS GREATEST OPPORTUNITIES

Food security presents a significant social challenge that public research universities have the capacity and responsibility to address. US government agencies, international organizations, NGOs, and foundations have identified food security as a priority and have devoted significant resources to promoting broader access to healthy, affordable food. Failures in achieving food security confront us in our community and around the world: Globally over 800 million people are undernourished; nationally, 13% of Americans are designated as food insecure; locally, 11.1% of Illinois households are classified as food insecure; and nearly 1 of every 5 children in Champaign County lives in a food insecure household. Failure to deliver food security undermines human development and security more generally, generating tremendous negative individual, social, and political consequences. Environmental change, population dynamics, social forces, and political instability all threaten to further undermine food security.

The challenge of achieving food security calls for expertise from a diverse set of fields and capabilities across the missions of education, research and public engagement. The United Nations Food and Agriculture Organization defines food security as existing when “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” Food security therefore requires sufficient and reliable food availability; universal food and water access; and nutritional sufficiency of food consumed. These dimensions of food security raise distinct but interconnected research challenges that span a wide range of disciplines and issues. For example, food availability raises issues of environmental sustainability, resource management, logistics, industrial practices, food safety, food preservation, waste reduction, and waste management. Food access involves physical proximity, economic affordability, and distribution across gender, age, ethnic, and other social categories. Food access can be improved through better infrastructure, public policy, and programmatic interventions to address poverty, poor sanitation, disease, violence, and social inequities. Nutritional utilization of food requires that food be nutritious, safe, and culturally acceptable to the consumer, and also that it be consumed in sanitary and healthy environments. Reliability of availability, access, and nutritional utilization involves mitigating climate shocks, creating resilient supply chains, insuring against price spikes and income shortfalls, and supporting personal health. Achieving food security requires discovery across all disciplines involved in understanding human and natural systems.

Beyond interdisciplinary research, meaningful university responses to food security need to embrace education and public engagement to inform and empower our students, policy makers, and the public at large and to ensure that research priorities are consistent with public needs. Because food systems research requires hands-on field work in a range of human and environmental settings, it is particularly amenable to experiential learning activities that can be transformational for students. Moreover, food security issues clearly resonate with students as demonstrated by their participation in various food systems initiatives, from sustainable farms to food pantries. Because food security is an area of urgent public need, university research can have the greatest impact if it is guided by informed public engagement and can effectively communicate findings to actors in the food system. The National Science Foundation's (NSF) Food, Energy and Water focus, the US Department of Agriculture's (USDA) National Institute for Food and Agriculture (NIFA), the "All of Government" Feed the Future Initiative, as well as Bill and Melinda Gates Foundation and Rockefeller Foundation all recognize that food systems problems require transdisciplinary research, and they all promote increased public engagement or education to ensure impact from research activities.

Land grant universities are uniquely poised to address food security challenges. First, food security challenges require a scale of activity and extent of commitment that can be mobilized in only a few settings. For example, research involved in developing crops that will be productive in a world of climate change demand a level of funding, institutional support, and sustained attention that is only available in a subset of research-intensive universities. Second, the complexity of food systems, encompassing food and agricultural sciences, life and biological sciences, engineering, health and human sciences, the humanities, social sciences, law, and other fields demands a breadth of perspective and capacities that exists only in major universities. Third, public investment in development of food security-related technologies and programs is needed if the emerging food system is to deliver food access and food quality that reflects shared social values. Fourth, the educational infrastructure of land grant universities reaches unmatched numbers of students who hail from diverse backgrounds and experiences, and the land grant Extension system offers a platform for broad community engagement that disseminates new knowledge while providing the public a voice to inform research efforts.

The nature of the food security challenge implies a particularly high value to creating institutional structures that promote transdisciplinary and integrated research, education and public engagement. The Association of Public and Land Grant

Universities (APLU) made a detailed statement of the importance of university engagement in food security in its 2017 report, “The Challenge of Change: Harnessing university, discovery, engagement and learning to achieve food and nutrition security” (<http://www.aplu.org/library/the-challenge-of-change/File>). The APLU report called for significant institutional transformations within academic institutions if the capacities of public research universities are to be mobilized to address food security. In particular, the report called for structures that would support and reward transdisciplinary, integrated, and problem-based instruction, research and public engagement that would have measurable impacts on sustainable food systems and food security locally and around the globe. Specifically, the APLU called for universities to:

- Elevate food and nutritional security to a top priority;
- Align university resources and structures for transdisciplinary approaches to address food security challenges;
- Enhance and build university-community partnerships; and
- Educate a new generation of students to be transdisciplinary problem solvers.

The University of Illinois offers the disciplinary breadth and excellence to address the complexity of food security research and the capacity across education and public engagement to translate discovery into impact. Some universities (Appendix B) have mobilized resources and created centers or institutes devoted to addressing food insecurity, but few of these units span the missions or encompass a wide range of disciplinary perspectives. The breadth and depth of relevant capacity at the U of I creates the opportunity to more fully achieve this vision of integrated and transdisciplinary education, research and engagement to promote food security locally and around the world. Indeed, the U of I has 150 years of experience and accumulated expertise in education, research and public service on food systems and has engaged globally for most of its history. We have the opportunity to leverage our capacities in food and agricultural sciences with strengths in the humanities, social and behavioral sciences, data sciences, health sciences, engineering and other fields to accelerate learning, discovery, and engagement for continuous food availability, access, and utilization in the diverse contexts now faced around the world. **Success in that effort will require that we identify and fill gaps in our capacities while creating new structures to integrate across disciplines and missions.**

B. STATUS, OPPORTUNITIES & CHALLENGES

1. Education Status, Opportunities, and Challenges

The capacity to respond as a society to food security challenges depends in part on broad understanding of the causes, nature, and implications of food insecurity. Renewed public interest in technological, ethical, environmental and health aspects of food has made this an

opportune time to more fully commit ourselves to educating students about food systems and thereby raise the quality of public discussion and public and private action related to food security. To empower people to grapple with the complexity of the food system that spans from development of seed varieties to the reclamation of food waste, the university faces a challenge of integrating widely disparate fields and facilitating meaningful experiential learning.

a. Status

Existing curricula at the University of Illinois demonstrate a high degree of instructional capacity and student interest. The extent to which food issues are woven into the curricula on our campus can be demonstrated in many ways. A scan of the 2017-18 Academic Catalogue (<http://catalog.illinois.edu/pdf/2017-18.pdf>) reveals 800 references to the word “food”. Existing courses related to food security encompass food and agricultural sciences, life and biological sciences, business, engineering, humanities, law, and social sciences, and they address domestic and international contexts. “Food” appears in descriptions of courses under 27 different programmatic headings in seven colleges for classes ranging from the 100 level through the 500 level (Appendix C). The university currently provides highly ranked disciplinary training in undergraduate and graduate degree programs in food and agricultural sciences, life and biological sciences, engineering, the humanities and social sciences related to food systems. For example, our Department of Food Science and Human Nutrition (FSHN) is ranked in the top 5% of all programs nationally. Additionally, U of I offers an interdisciplinary graduate program in nutritional sciences and four interdisciplinary undergraduate minors related to food security (Food Science; Nutrition; Food and Environmental Systems; and Food and Agribusiness Management). Multiple concentrations within graduate and undergraduate majors relate to food and nutrition. Food security is an element of the recently approved undergraduate certificate in Global Health; it is built into a proposed graduate certificate in technology and security; and it is central to various faculty-led study abroad programs. Moreover, an interdisciplinary undergraduate degree program in Metropolitan Food and Environmental Systems (MetroFES) is under development in the College of ACES.

b. Opportunities

The University of Illinois has the opportunity to leverage its base of research and public engagement on food security to provide structured experiential learning programs for greater educational impact. Current instructional resources provide learners with opportunities to develop deep and multidimensional understanding of food systems and food security. The elements are in place to provide innovative and transformative learning experiences by integrating public engagement and research into structured student experiences that will complement existing courses and curricula. Food security presents a rich area for experiential learning for three reasons: (1) there are ample opportunities for service learning associated with UI Extension and other engagement activities, (2) applied food security research provides opportunities for undergraduate experiences in labs, fields, and in social science research, and (3) there is considerable student interest in food issues as demonstrated by activity of Registered Student Organizations. Integrating experiential opportunities into student learning will help us equip a new generation of technical experts, engaged citizens, and political leaders to tackle the challenges ahead.

The University of Illinois could integrate experiential activities into food security education by supplementing existing curricula and by supporting extracurricular activities. The specific mechanisms described below would integrate research early in education to build analytical skills; provide hands-on, real world experience to demonstrate the specifics of food insecurity domestically and in low-income countries; and prepare students for professional engagement. UI Extension, U of I Siebel Center for Design, and Smart Transportation Infrastructure Initiative as well as the U of I System-based Discovery Partners Institute (DPI)-Illinois Innovation Network (IIN) (<http://innovation.uillinois.edu/>), and its proposed Center for Advanced Food Infrastructure, offer avenues for experiential learning partnerships. A research-based program modeled after the Ethnography of the University initiative also merits consideration. Hands on experience working on food security issues with these and other groups including researchers on campus could be built into student experiences through new courses, a certificate program or a Food Security Scholars program and could be supported through extracurricular programming as well.

Development of Experiential Courses

Coursework is enriched by real-world experiences, and vice versa: research and practical experience take on more meaning when students develop larger theoretical and conceptual perspectives. The U of I could facilitate the creation of classes that integrate service or research by centralizing information on possible research and engagement activities for students. We could incentivize the creation of classes that mix abstract and hands-on learning through course development grants. These research-oriented and experiential classes could be offered as stand-alone experiences, built into existing degree-granting programs, and connected to a new Global Food Systems and Food Security Certificate.

Global Food Systems and Food Security Certificate

A certificate program would structure and coordinate existing course offerings, develop and implement any essential missing courses, and provide a framework for connecting faculty research and engagement programs to undergraduate courses housed in existing academic units. This program would differ from existing academic programs by including local and international experiential learning activities to provide a more complete understanding of the global food system. In addition to coursework, students in this program might spend one summer completing an internship with a food bank, the U of I sustainable student farm, or a private firm in the food sector followed by an on-site study program focused on food or water issues in Africa. This program would leverage existing study abroad and internship opportunities and increase their value by directing students to complementary courses and creating a focused emphasis on specific themes and diverse contexts. The emerging Food and Agricultural Systems for Global Health cluster hire in the College of ACES may dovetail with this initiative by providing new faculty resources.

Food Security Scholars

To create a cohort of graduates who have disciplinary excellence and deep understanding of food insecurity, we propose launching a food security scholarship program for 20 top

undergraduate students, prioritizing candidates who come from communities in Illinois with high rates of food insecurity, have received supplemental nutrition assistance program benefits, or come from low-income countries. Undergraduate Food Security Scholars would be required to complete a core seminar on food security topics, in addition to requirements for their primary majors/concentrations, participate in a faculty-led research study on food security, and complete an experiential learning project via summer internships or academic externships. This model of interdisciplinary learning focused on a societal challenge and real-world experience has been used successfully by the Cancer Scholars Program, which launched in 2014 with 12 undergraduate scholars per year.

Extracurricular Support

Outside of formal curricula, U of I could promote experiential learning related to food security by providing:

- A clearinghouse of experiential opportunities for students from across the campus, ranging from agricultural sciences to humanistic inquiry.
- Competitive research grants for food security work by undergraduate and graduate students, with preference given to students from underrepresented groups.
- Competitive research grants to enable faculty in humanities and social sciences to hire undergraduate research assistants.
- Coordination and facilitation of research experiences for undergraduates by connecting them to faculty with external funds and helping them to compete for NSF-Research Experience for Undergraduates (REU) programs in food security and the McNair summer research program for underrepresented students.
- An inclusive residential learning community around campus- and community-based food security issues, practices, and problems that engages students from diverse backgrounds, thought perspectives, and approaches to scientific inquiry.

c. Challenges

Executing these curricular and extracurricular programs would require a support office to serve as a clearinghouse for opportunities, to develop and coordinate programs, to provide a central point for student and faculty support and interaction, and to communicate achievements and impact. No such office currently exists with a campus-wide scope and food security focus.

Specific challenges to be addressed include finding means to:

- provide supervision for the programs described above;
- connect students and instructors with UI Extension personnel and others engaged in public service;
- develop formal interdepartmental programs that support departmental financial and curricular interests;
- provide funding to students to make internships and research experiences financially accessible;
- advise students interested in food security from multiple departments;

- incentivize and enable faculty to provide experiential learning and research opportunities to undergraduates.

2. Research Status, Opportunities, and Challenges

The University of Illinois is home to impactful research on all dimensions of food security in domestic and international contexts. The nature of food security problems creates the opportunity to do more impactful research by integrating across disciplines and missions. Investment in capacity and in structures to support interdisciplinary efforts is needed to capitalize on this opportunity.

a. Status

Food security research exists in many colleges and institutes. It is often funded at high levels; and it generates well-respected scholarly output. Data from the office of Sponsored Projects indicates the campus had over 125 funded projects related to food security in 2017 and they accounted for over \$200 million in externally sponsored activity. A partial list of these projects is provided in Appendix D. While this list is incomplete and underrepresents activities in fields that do not require external grants, it does suggest the breadth and scale of our work. Many of the largest projects are housed in existing institutes, suggesting that where structures exist for interdisciplinary work, significant research on food security can emerge. This section demonstrates the scope of current U of I research on food security and describes selected projects that form models for expanded food security research and platforms for experiential learning.

Current Research to Increase Food Availability

Research at the U of I could dramatically alter food availability. For example, Realizing Increased Photosynthetic Efficiency (RIPE) is engineering plants to photosynthesize more efficiently to increase crop yields. By sustainably increasing the productivity of staple food crops, the project aims to reduce hunger and poverty for farming families in Sub-Saharan Africa and Southeast Asia. Based in the Institute for Genomic Biology (IBG), RIPE was formed in 2012 with a five-year, \$25-million grant from the Bill and Melinda Gates Foundation. (A \$45 million renewal was announced in 2017, but does not appear in Appendix D.) Other projects in the IGB, Institute for Sustainability, Energy and Environment (iSEE), Crop Sciences (CPSC), Animal Sciences (ANSC), Agricultural and Biological Engineering (ABE), Agricultural and Consumer Economics (ACE), FSHN, Natural Resources and Environmental Sciences (NRES), and Plant Biology also aim to increase the sustained availability of food at a global scale while conserving natural resources.

Considerable research on food production is focused in developing countries. Some of this work demonstrates the value of interdisciplinary, problem-based approaches. For example, the \$12 million Soybean Innovation Lab fosters the development of systems to meet Africa's rapidly growing demand for soybeans while providing income to small-scale farmers by mobilizing plant scientists to breed soybean varieties appropriate to local conditions, environmental engineers to ensure that agronomic practices are sustainable, mechanical engineers to develop appropriate scale processing equipment, gender studies experts to understand how to include women farmers in new opportunities, and economists to structure markets that efficiently link farmers to buyers. Other research in developing countries includes work on: rice genetics and agronomy for Asia (IRRI-Lee program); postharvest loss prevention in grains in Asia and Latin America (\$12 million in the U of I Institute for Prevention of Postharvest Loss); and farmer advisory systems for developing countries (\$40 million for extension strengthening programs).

Current Research Addressing Food Access in the United States

A central way that food access is assured for low-income households in the United States is through food assistance programs, especially the Supplemental Nutrition Assistance Program (SNAP). Faculty ACE, Economics, and Human Development and Family Studies (HDFS) are conducting important research on the efficacy of these programs. The U of I Family Resiliency Center houses the interdisciplinary Food and Family program that examines the particular conditions that affect food, health and developmental outcomes among diverse types of families in the United States. In another example, a \$2.5 million grant from USDA-NIFA has explored the impacts of after-school nutrition education on dietary quality and health status of middle school children. Focusing on our own campus, researchers in ACE and FSHN are examining the nature of food insecurity among our students and staff.

Current Research Addressing Food Access in Low-Income Countries

Access to food by households in low-income countries is also an area of active research at the U of I. Researchers in ACE and Civil and Environmental Engineering, for example, are using NSF support to apply innovative data collection and integration methods to better understand policy, market, and environmental factors driving shocks to food access among households in rural Zambia. Another project in ACE uses support from NASA to understand how technologies to improve food production under environmental change are affecting food consumption of rural families in Africa.

Current Research on Nutritional Utilization of Food

Food quality, safety and sanitation as well as individual nutritional status all contribute to nutritional utilization of food. Investigators in FSHN have conducted impactful research in food quality and food safety applied to developing countries and domestically. Moreover, integrated research across food science and human nutrition explores the mechanisms of poor dietary and nutrient quality of food on human health in the context of food insecurity with implications for individual, family, and community education and intervention. Likewise, Civil and Environmental Engineering (CEE) houses well-established programs in clean water and sanitation which are critical elements of nutritional utilization of food. With a \$1 million industry-funded grant, and interdisciplinary team of scientists in FSHN, ANSC, the College of AHS, and the Division of Nutritional Sciences (DNS) have investigated the role of dietary fibers on the human gastrointestinal microbiota to understand how gut microbes and gut health are impacted by food quality and bioactive food materials.

Current Research on Reliability of Food Availability and Access

Our current research also explicitly addresses the reliability of access in the face of catastrophic events. A research team of the Multi-hazard Approach to Engineering (MAE) Center (<http://mae.cce.illinois.edu/>) is focusing on the role of interconnected infrastructure networks on food access and how natural disasters impact such networks. With \$2.5 million in NSF support, this research seeks to develop a framework that integrates multiple computational models that can be used to guide regional decision-making in the United States, both before a disaster (in order to mitigate impact and improve resiliency) and after (to guide recovery efforts). Other projects on campus study the effect of climate shocks on food availability and access in Sub-Saharan Africa and South Asia. Along with ensuring the availability of food during climate shocks and natural disasters, work across campus has concentrated on what ensures households have enough food at all times throughout the year. This work has included research on the role of income shocks on food insecurity, the effects of children not receiving school meals during the summer, and evaluations of programs designed to help provide consistently reliable food resources.

b. Opportunities

The University of Illinois' depth in a variety of areas related to food security positions us to integrate across fields to address research challenges that often confound disciplinary approaches. Internal observers and external agencies, including funding agencies like the NSF, NIH, USAID, and USDA-NIFA have emphasized the potential for increased impact from research efforts that build multidisciplinary teams around specific challenges. U of I is addressing food security with agricultural and biological sciences, computational sciences, engineering, health sciences, social sciences and the

humanities, but much of the work appears to be disconnected such that scholars working on related problems (including members of this task force) are often unaware of each other's activities. While we have achieved excellence in important areas of inquiry, our contribution to problems that require broad interdisciplinary effort is largely restricted to the subset of food security issues that are closely aligned to existing institutes, centers or thematic programs.

The U of I has the opportunity to foster interdisciplinary work to address many additional food security challenges by:

1. Building shared knowledge and linkages among scholars through establishing a community of researchers interested in food security; cataloging activities of these scholars; and convening researchers in targeted seminars and symposia.
2. Supporting collaboration through establishment of multidisciplinary working groups on food security-related themes and providing seed funding to interdisciplinary teams.
3. Expanding capacity through a targeted hiring program.

Potential research themes that transcend disciplinary lines, build on U of I strengths, and address recognized challenges include:

1. **Data Science for Food Security:** Can we leverage U of I strengths in data science and computation to build inclusive food systems? Can data science be applied to famine early warning? To increase yields in developing countries? To develop nutritional health applications? Using novel data collection and analytical techniques to improve international food security requires engagement across food and agricultural, social science, statistics, and computational science disciplines. The U of I could build on the existing program in Big Data for Food Security and the Environment (<https://publish.illinois.edu/foodsecurity/>) to combine data science with expertise in food and agriculture. Activities in this area would be enhanced through coordination with the Illinois Data Science Initiative to facilitate access to novel data analytics tools, technical support and other services.
2. **Food Innovation for Nutritious Diets:** Food prices often lead vulnerable households to eat high calorie/high fat foods rather than more costly "healthy foods". How can we enable the food system to deliver healthier foods cheaply in domestic and international markets? Pressure to reduce costs can lead to risky food handling. How can we better ensure safety of our food system, food systems in developing countries and the increasingly integrated global food system? Building on current work in FSHN as well as the nanotechnology center, and creative work in water quality in the College of Engineering, a Center for

Food Innovation could focus on designing foods and processes that promote affordable, safe and nutritious diets.

3. **Resilient, Inclusive Infrastructure:** Are there infrastructure solutions to address chronic problems in food distribution in slums around the world and acute problems brought by extreme natural events (e.g., earthquakes, hurricanes, wildfires)? Are there infrastructure solutions to insure food production, processing and distribution methods are resilient to increasingly frequent severe weather events? How can public investment address food deserts? The problem of inclusive, resilient infrastructure to ensure food security touches on agricultural and biological engineering, civil and environmental engineering, business, law, finance, urban planning, geography, data science and other fields that have yet to be coordinated to address the challenge.
4. **Climate Resilient Food Systems in Developing Countries:** Food security is directly tied food production for most people in developing countries as they depend on farming for direct consumption and for income. Can food production systems that are resilient to climate change be developed for developing countries? Can technical challenges to sustainably increasing production in those areas be reconciled with profitable participation by current smallholder producers? Is controlled environment agriculture be part of the solution for these systems? Can production be increased without further stressing limited environmental resources? Can increased production from those areas affect food insecure consumers in the same regions? These questions demand an understanding of complex systems that is best analyzed through combined depth in engineering, bio-sciences, social sciences and ecology.
5. **Food Justice and Food Security:** The evolution of food systems raises basic questions about cultural values, sovereignty, consumer rights, ethics, and social norms. History, political science, anthropology and other fields provide valuable perspectives on issues such as famines, resource wars, ecological collapse, commodification, social norms, tastes, taboos, biological and technical innovation, labor regimes, public policy, population growth, and changing foodways. The humanities have much to offer to the underlying debate about sustainable and just food systems, but are rarely integrated into defining research questions. Leveraging the Illinois Program for Research in the Humanities with our capacities in food and agriculture could lead to new dimensions to research and engagement on food issues.
6. **Food Insecurity Among Persons with Disabilities:** Rates of food insecurity in the US are substantially higher in households with someone who has a disability. Despite this fact, research has been relatively limited on this topic. How do mental health issues like depression affect access to food and nutritional

assistance? How are those mental health issues exacerbated by food and nutritional insecurity? How does access to food affect caregiver capacity? What impedes food security for persons with physical disabilities? The U of I is a global leader in research on disabilities and is well-positioned to move this issue forward. Examples of work on campus include the Center for Health, Aging, and Disability and the Leadership and Education in Neurodevelopmental Disabilities (Illinois LEND). The opportunity to connect the expertise in disabilities with expertise in food systems is underexploited to date.

7. **Health Consequences of Food Insecurity:** The advent of the new College of Medicine allows access to wider populations through which we can better understand the mechanisms by which food insecurity affects health outcomes. In addition, we can see how food insecurity may impede the ability of recovery from medical interventions, including cancer treatment. As one example, work on food security in relation to the health of cancer survivors could reinforce cancer-related activities outlined by the Health Sciences Strategy Task Force, leading to synergy between strategic campus efforts. This area will expand and better integrate collaborations among the Colleges of ACES, AHS, and Medicine.

c. Challenges

These examples illustrate socially relevant themes that can best be addressed through by groups of scholars who are experts in diverse fields but work in conversation across disciplines. The University of Illinois has depth in the relevant disciplines to address these themes but faces at least two challenges in doing so.

- **U of I lacks a structure for incubating transdisciplinary teams** across the relevant disciplines. Incubating interdisciplinary teams requires mechanisms to identify areas of sufficient faculty interest and social need to justify investment, and to support team formation and group learning on specific, transdisciplinary problems. Current tools for building collaborations across the campus, such as the Illinois Experts database, are difficult to mobilize for food security-related partnership because the multi-dimensionality of the issue hinders the effectiveness of key word searches in locating appropriate contacts.
- **U of I faces gaps in capacity in some areas.** The process of developing themes such as those listed here, will reveal gaps in our capacities. Indeed, faculty resources in key areas related to food security may be declining even as new dimensions in food research are emerging. Since 2008, the count of tenure track faculty lines in the College of ACES has fallen by 15%, from 220 to 187 FTEs (DMI:1603). This trend in faculty resources in areas central to broad-based food research is likely to have created capacity gaps. Success in becoming a

global leader in the areas listed above requires strategic hiring to create coherent clusters of faculty with shared thematic focus in addition to development of mechanisms to support those clusters of faculty.

3. Engagement Status, Opportunities, and Challenges

The University of Illinois is engaged in a variety of food security related engagement activities led by students, faculty, and UI Extension personnel. While these activities are impactful, there remains evidence of untapped interest in engagement and unmet needs for service. Engagement activities are often disconnected from each other and from teaching and research. The U of I can increase the impact of its engagement by creating a centralized resource for coordination, communication, and convening related to food security.

a. Status

U of I engagement on food security occurs in many spheres and at many scales. Our activities are based in federally and locally funded programs of UI Extension, federally funded international programs such as AgReach, student activities like the Illini Fighting Hunger, and public-private partnerships. Our faculty are also involved with major state and national groups addressing food security issues domestically and abroad. We are engaged as advisors or consultants with, for example, Feeding America, the Food Tank, the Chicago Council on Global Affairs, and international NGOs like Oxfam and Heifer International. It is increasingly common for sponsors of research-oriented grants to require public engagement elements in the work they support. As a result, outreach activities related to food are distributed across the campus, but with a core of capacity found in UI Extension.

UI Extension. UI Extension has a presence in all areas of the state. Its programmatic topics, which include agriculture and natural resources, family and consumer sciences, community and economic development, and 4-H/youth development, provide research, outreach, and education related to food production, safety, and access. Specific areas include commercial agriculture, horticulture, energy and environment, local foods and small farms, consumer economics, family life, nutrition and wellness, and Illinois nutrition education programs. Combined with youth and community programs, these UI Extension efforts cover a broad range of issues related to food security.

Extension programs address challenges to sustainable food production by commercial farms and community gardeners through state-wide and location-specific programming with activities like FarmDoc, a web-based decision support service for cornbelt crop

producers, and the Pesticide Safety Education and the Certified Livestock Managers Training Programs, which provide training and mandatory certification for operators and producers. These programs touch thousands of people annually.

UI Extension also receives federal and state resources to promote food access through programs including SNAP-Ed, *Abriendo Caminos*, and the Nutrition Environment Food Pantry Assessment Tool (NEFPAT). The SNAP-Ed program, for example, has received grants totaling over \$30 million to ensure that recipients of food assistance can make the best use possible of their resources to provide healthy diets to their families, and to assist communities to improve their environments for food access. *Abriendo Caminos*, meanwhile, provides assistance for nutritional education to Latino families in Illinois, and the NEFPAT evaluation instrument assists food pantries in the state in improving their capacity to provide services to at-risk populations.

Distributed Campus-Based Public Engagement. Public service related to food security extends beyond UI Extension to include numerous student organizations involved in production issues (e.g., Student sustainable farm, food science student organizations, food and agribusiness association, etc.), and hunger issues (Illini Fighting Hunger, Wesley Food Pantry, Project4Less, UNIFY). In one indicator of the vibrancy of these groups, Illini Fighting Hunger has packaged and distributed over 1.5 million meals since 2012. Our students, faculty, and staff are addressing hunger and food issues on our campus and in our community with community groups like the Prosperity Gardens, and meal service and food pantries like the Jubilee Café, The Wesley Food Pantry, Newman Shares Food Pantry, Eastern Illinois Foodbank, and the Campus Kitchens Project. The U of I Press advances public understanding of food security issues through its highly esteemed food studies book series.

Global Engagement. Through programs funded by the US Agency for International Development, the U of I has become a recognized global leader in public engagement and extension related to food production and nutrition in developing countries. The AgReach program with its specific projects relating to food, nutrition and gender issues in Africa and South Asia has received over \$40 million in funding for work to transform public engagement systems around the world. Its activities have enhanced the quality of food and nutritional extension services reaching over 11 million people. Other international engagement involves efforts from our Institute for Prevention of Postharvest Loss which works with partners to enable smallholder farmers in South Asia to avoid spoilage of their harvests and engages with policy makers whose ability to assess food policy questions can affect the access to food for millions of people in low-income countries.

b. Opportunities

The University of Illinois has the opportunity to integrate our vibrant engagement activities with our research and educational enterprises and with each other to enhance all three missions and magnify our visibility and leadership in this arena. Work being done in public engagement related to food security is often detached from the research of our scientists, the educational experience of our students, and even the other engagement efforts of distributed actors. External trends and developments are increasing the potential returns to improved coordination. The U of I has the opportunity to:

Leverage research to inform emerging engagement efforts. There is a growing sense of urgency on campuses around the country to address local hunger issues and hunger among students in particular (<https://www.nytimes.com/2018/01/14/opinion/hunger-college-food-insecurity.html>). To date, only modest research has been applied to understanding the causes of food insecurity among students and the efficacy of alternative interventions, such as financial counseling compared to food pantries or cooking classes. By connecting scholarship to engagement more systematically, U of I could improve the efficacy of public service to address hunger locally and in diverse contexts around the country and the world.

Leverage engagement for more informed research. Sponsors and partners are increasingly aware of the importance of including extension or engagement experts in the generation and execution of food-related research in order to increase the likelihood of research results affecting behaviors and transforming lives. U of I can connect existing expertise in engagement and extension to researchers to improve the relevance of their work and to make integrated research-service proposals more competitive.

Interact systematically with the Discovery Partners Institute and Illinois Innovation Network (DPI-IIN) on food security issues. As announced, Food and Agriculture is one of the primary themes for the DPI-IIN, envisioned as a billion dollar investment for a state of the art research institute for industry, venture capitalists, faculty and students. The creation of the DPI-IIN with a concentration in food innovation would imply new opportunities to leverage the state's food and agricultural industry for engagement, research and transformative learning at U of I, if there is a clear gateway between the U of I and DPI-IIN. Placement of new UI Extension personnel in the DPI-IIN facility in Chicago could be important to establishing such a gateway. Coupled with the proposed new academic MetroFES major in the College of ACES, partnership with UI

Extension and other engagement experts in the DPI-IIN could provide a model for public-private partnerships for education, workforce development, and entrepreneurship related to food.

Create service learning in food security as a signature feature of U of I engagement.

Renewed attention to food security issues creates the opportunity to develop a campus-based service learning program to address food insecurity and health concerns within the community as a way of meeting local needs and creating transformative student experiences. Engaging students in food security-related community activities like working within food pantries or providing SNAP-Ed counselling can be transformative in building students' understanding of the food system and food insecurity. The impact of such activities is much greater when synchronized with formal courses to provide concepts for understanding what students observe or experience and contexts for interpreting the activities. The direct value of public engagement in the form of service provision might be multiplied by embedding the experience into a learning process. An example of this approach is the Humanities Gateway to Community Service Undergraduate Internship/Volunteer Project and Odyssey Project created from the IPRH. In the proposed model, students who represent the richness of diverse lived experiences could select the Food Security track to combine volunteer or service-learning work with disciplinary courses related to food to elevate their understanding of this social issue while examining how their experience and education inform their thinking.

c. Challenges

Challenges to achieving greater impact in public engagement related to food security include:

- Reductions in financial support to UI extension that have diminished our capacity to deliver services through that system. Since 2007, UI Extension professional staff has shrunk from 363 FTEs to 234, a drop of 35% (DMI:KL43);
- Incentive structures for faculty that may not reward public service efforts relative to research or teaching;
- Fragmentation of existing public engagement activities, particularly those that occur outside of UI Extension;
- Absence of highly visible entry points for external parties interested in engaging with the U of I on issues related to food security;
- Absence of mechanisms to coordinate across engagement activities or between engagement activities, teaching and research.

C. SPECIFIC ACTIONS IN EDUCATION, RESEARCH, AND ENGAGEMENT

Short term (1- 2 years):

Establish Illinois Food Security Institute (IFSI).

Many of the opportunities for the U of I in the area of food security involve integrating, coordinating, or focusing existing resources to enhance their impact and visibility. By establishing an Illinois Food Security Institute (IFSI) the campus could create a hub for integrating and stimulating work on food security. The goals of IFSI would be to:

1. Facilitate experiential learning opportunities related to food security.
2. Foster linkages among researchers addressing all existing and future components of food insecurity and factors affecting food security.
3. Provide services to enhance the capacity of faculty and students to engage in food security-related research and technology and education translation and dissemination.
4. Increase the coordination, visibility and impact of engagement and UI Extension related to food security.
5. Create a forum for integrating activities related to food security across the missions of research, education and public engagement.

Defining features of IFSI would be the intentional integration of student experiences, transdisciplinary inquiry, and meaningful public engagement. IFSI could build on some activities currently housed in the International Food Security at Illinois program (<https://intlprograms.aces.illinois.edu/food-security>) but would add greater resources for integrating student experiences and public engagement and an expanded scope to encompass both domestic and international food security issues. Structurally, IFSI could consist of:

1. *A Food Security Experiential Education program.* Through this program the campus would make food security-related experiential learning opportunities more accessible and more meaningful. The office also would support extra-curricular experiential and service learning activities.
2. *An Integrative Food Security Research program.* This arm of IFSI would build linkages among scholars on campus, support thematic workshops and other activities, and provide seed funding for interdisciplinary research that engages the public and our students.
3. *A Food Security Resource Center.* The Food Security Resource Center would serve as an outreach hub, providing a public engagement access point for the campus and community. This center would coordinate the multiple food security-related engagement activities of the campus, from efforts to ensure food security within the campus community to action-oriented activities

abroad. It would provide a clearinghouse of opportunities, a forum for dialogue among researchers and practitioners, and an incubator for campus-based engagement.

IFSI would require a full-time director, office support staff, and associate directors for education, research and public engagement. Funding for student Scholars, grants, workshops and seminars is also required.

Activities for IFSI in the first two years would include:

General Services:

- Establish a food security community of interest of engagement professionals, researchers and faculty from the range of disciplines represented on our campus.
- Catalog all educational, research and engagement activities related to food systems for food security, domestically and abroad.

Educational Efforts:

- Establish a campus-level point of contact charged with coordinating, developing, and promoting domestic and international experiential educational opportunities related to food security.
- Provide a clearinghouse for experiential and service learning opportunities tied to research and engagement activities.
- Launch the Food Security Scholars Program, and the Global Food Systems for Food Security Certificate Program.
- Establish seed grants to introduce experiential and service learning experiences into existing academic unit majors and concentrations, focusing on students from diverse backgrounds.
- House existing International Graduate Research Awards in Food Security (currently housed in the College of ACES) and expand that program to include undergraduates and to cover domestic food security concerns.

Research Support:

- Launch program to support workshop series on themes proposed by interdisciplinary teams of faculty, staff or students. Workshops are to prepare participants to apply for internal seed grants and external support.
- House existing Annual Food Security Symposium (currently housed in ACES).
- House existing Food Security Distinguished Lecture Series (currently housed in ACES).
- Provide for a speaker's series that would enable internal and external speakers from a wide range of disciplines to share their research on food security issues.

- Develop plan for targeted hiring to strengthen capacity in transdisciplinary, cross-mission food security related research, education, and public outreach. Emphasize inclusion of faculty from underrepresented groups.

Engagement Activities:

- Hire a campus-level associate director for public engagement activities related to food security domestically or internationally.
- Build ties to private sector partners at DPI-IIN and elsewhere as well as charitable organizations and public sector domestic and international agencies. Focus on inclusivity and sensitivity regarding the communities surrounding the DPI facility.
- Convene meetings of stakeholders to facilitate learning and engagement and to connect researchers to service providers.
- Use catalog of food security activities to connect students and faculty to engagement opportunities.

Medium term (2-5 years)

General Services:

- Support hires under a targeted hiring program to fill critical needs in research, education or public engagement related to food security, focusing on underrepresented groups.
- Launch of seed grants program for work in food security that involves transdisciplinary research that engages students and includes substantive participation from public engagement specialists or UI Extension. Participants in workshop programs are expected to be among applicants.
- Develop a program for visiting scholars and post-doctorate fellows to catalyze multidisciplinary research, education and engagement efforts.

Educational Efforts:

- Continue previous programming.
- Launch student symposia and or publication for Food Security Scholars and Global Food Systems and Food Security program participants.
- Incentivize existing faculty to partner with the Food Security Scholars Program.

Research Support:

- Continue to support working groups on specific themes.
- Continue other programming.
- Launch seed grants and grant development support for transdisciplinary research that engages students and includes substantive participation from public engagement specialists or UI Extension personnel.
- Intensify support for external grants applications through facilitation of teams, writing support and seed grants.

Engagement Activities:

- Continue previous programming.
- Develop a communications program that works with researchers and UI Extension Specialists to facilitate visualization and other methods of communication of research findings to interested stakeholders.
- Develop clearinghouse of research and best practices for engagement efforts.
- Develop UI Extension programs of work around food security of metropolitan areas coordinated with DPI-IIN and of rural areas coordinated with UI Extension.

Long term (5-10 years)

- Continue programming.
- Initial workshop themes become independently funded centers or programs.
- Expand staffing based on external awards.
- Expand opportunities for education and engagement based on externally funded research programs.
- Expand opportunities for research based on expanded external support for public service/public engagement activities.

D. WAYS TO LEVERAGE RESEARCH STRENGTHS

The IFSI framework is intended to create a mechanism for experiential learning that taps our research and engagement strengths to support the education mission. The global footprint of research on food security provides ample opportunity for student research and engagement. The Food Security Scholars program and the Global Food Systems for Food Security Certificate are to be differentiated from existing food-related minors and certificates by requiring experiential learning tied to research or engagement activities and by inclusion of international and domestic food security studies.

E. WAYS TO ENGAGE COMMUNITY

The U of I is in the rare position of having all aspects of the food system in close proximity to campus and having opportunities to engage with all dimensions for food security (availability, access, nutritional utilization, and reliability) in the community. We could magnify our local and global engagement by using the proposed IFSI as a clearinghouse, coordinator, and convener.

U of I faculty, staff and students are already engaged in the local community in food production and processing through interaction with global agribusinesses, large-scale

grain and livestock operations, small-scale community gardens and our own student farm. We are addressing access through partnerships with international agencies like Oxfam America, domestic agencies like Feeding America and community organizations like the Jubilee Café. With community partners, our students, staff and faculty are engaged in work to improve sanitation and nutritional health in low-income countries and address nutritional education and health locally.

While this engagement exists, it has thus far emerged with little connectivity and there remains evidence of untapped interest in engagement and unmet needs for service. By providing a point of contact for engagement related to food security the proposed IFSI would enable community members to raise awareness of needs and give students, staff and faculty access to opportunities to engage.

In addition to serving as a clearinghouse for information on needs and opportunities, the proposed IFSI could serve as a convener to create spaces for researchers and community groups to interact. By creating space for such interaction, we could allow scholars to better understand the constraints and perspectives of food insecure populations, service providers, and food industries and agribusinesses. At the same time, such a convening role could serve to enable the various participants in our food system to gain a deeper understanding of research and discovery related to food security.

Appendix A. Information Collection Methods

Because the activities of the Food Security Strategy Task Force (FSSTF) have wide-ranging, interdisciplinary reach and implications, the members of the FSSTF were selected to represent the broad perspectives at the University of Illinois. During the first meeting of FSSTF in November 2017, the TDSTF decided to answer the Task Force's Charge by first identifying the food security assets, investments, and connectivity on campus, and then providing a vision for deepening and broadening these strengths. The committee was limited in its ability to gather information and perspectives by staff constraints and the short time frame for action.

In November and December, 2017, the FSSTF collected input (formally and informally) from various individuals and groups across campus. The FSSTF chair contacted administrators at the Illinois Experts program, Sponsored Programs Administration (SPA) within the OVCR, and the Library to request keyword searches of databases in order to inventory activities related to food security based on funded projects and publications. The Task Force sought and welcomed formal meetings and input with representatives from various units. Individuals who provided significant input to the committee included: Chi-Fang Wu, School of Social Work; Kathy Baylis, Agricultural and Consumer Economics; William Barley, Department of Communication; David Richardson, OVCR; Dean Kimberlee Kidwell, College of ACES; Kristy Kuzmuk, Office of the President.

Appendix B. Food Security Related University Centers

A number of universities have established food security institutes, which range in activity level from hosting seminars and workshops to providing funding and having a number of dedicated research faculty. While numerous universities have centers focusing on food security, they are usually focused on domestic or global issues, not both. Many of these institutes are based in Colleges of Agriculture or Veterinary Medicine and are often focused on one or two key topics, such as irrigated agriculture, or plant or animal health. Only a few centers reach to other colleges such as Engineering or LAS. Only a few have dedicated faculty or post-doctoral staff other than a director or directors, and few appear to have integrated research, outreach and educational missions.

Description of Food Security Related University Centers

Institute	Disciplines involved	Dedicated Faculty Lines?	Activities
North Carolina State: Global Food Security Institute ,	Ecology, plant science, remote sensing, data analytics, engineering	yes (4 cluster hires)	Research, Engagement
The Ohio State: Food Innovation Center	Campuswide (15 colleges)	4 directors from other colleges within the university system	Research, Education and Engagement
Purdue Center for Global Food Security	Campuswide	Executive Director, Managing Director, and nine member Executive Committee.	Research, Education, Engagement
Stanford Center of Food Security and the Environment	Data Science, Hydrology, plant science, Aquaculture and fisheries, tropical oil crops	Yes (6)	Research
Texas A&M University: Borlaug Institute	Agricultural engineering, Agriculture, Economics Policy, Environ. sciences, Food science & safety, Leadership	Yes	Research, Engagement (international)
University of California System: Global Food Initiative	Agriculture, medicine, nutrition, climate science, public policy, biological science, humanities, arts, law	Yes	Education and Engagement (local issues).
University of California, Davis: World Food Center	Agriculture, food science, nutrition, veterinary medicine, public health and policy	No	Research and Engagement.
University of Nebraska: Water for Food	Hydrology, Engineering, Agronomy, Agricultural Economics, Political Science, Law	Yes; also includes visiting research scholars and postdocs	Research and Engagement
University of Minnesota: Secure Food, Water and Energy Challenge	Campuswide	Yes, 29 Interdisciplinary research teams, 2 six-member Grand Challenge Research Scholar Collaboratives	Research and Education

The Next 150 Food Security Strategic Plan Task Force

Institute	Disciplines involved	Dedicated Faculty Lines?	Activities
Yale Sustainable Food Program	Sustainable farming (organic)	Yes (1)	Education (domestic)
University of Kentucky: Center for Poverty Research	economics, food science, public health, sociology, social work, public policy, political science	No, but have two student fellows	Research and Engagement
University of Missouri: Interdisciplinary Center for Food Security	Rural Sociology, Sociology, Geography, and Nutritional Sciences	6 professors, 2 grad students and a project coordinator	Research and Engagement (domestic)
Columbia University: Agriculture and Food Security Center	Ecology, Biogeochemistry, Soil Science, Forestry, Economics, Computer sciences, Statistics, Ag Econ, International Affairs, among others	4 lines of research, full time staff works on them, also postdoctoral students and affiliated staff from other centers and universities	Research (international)
University of California Berkeley Food Institute	Natural resources, public health, public policy, law and journalism	No	Engagement (domestic)
University of Florida: Institute for Sustainable Food Systems	Economics, Plant Pathology, Agricultural and Biological Engineering, Soil and Water Science, Forest Resources and Conservation	Director and 6 other faculty members, all associated with other departments at the University	Research (international)
Iowa State University: Center for Food Security and Public Health	Animal Sciences	Yes	Training and Education
Tata-Cornell University Agriculture and Nutrition Initiative	Inter-disciplinary: Nutrition, engineers, climate, soil scientists, animal scientists and sociologists	No	Research (international)

Appendix C. Course Offerings at the U of I Referring to Food in the Class Description

Unit (additional course heading where applicable)	College
Agricultural and Consumer Economics	ACES
Agricultural Education	ACES
Animal Sciences	ACES
Crop Sciences (Horticulture, Plant Pathology)	ACES
Food Science and Human Nutrition	ACES
Human Development and Family Studies	ACES
Natural Resources and Environmental Sciences	ACES
Agricultural and Biological Engineering (Technical systems management)	ACES/Engineering
Agricultural Communications	ACES/Media
Community Health	AHS
Business Administration	Business
Chemical and Biological Engineering	Engineering
Anthropology	LAS
Asian American Studies	LAS
Chemistry	LAS
Communications	LAS
French	LAS
History	LAS
Integrative Biology	LAS
Molecular and Cellular Biology	LAS
Political Science	LAS
Sociology	LAS
Pathobiology	VET
Veterinary Clinical Medicine	VET

Appendix D. Selected Sponsored Projects Related to Food Security

Data provided by Office of Sponsored Projects based on key work search of titles and review to remove unrelated projects. This table is not comprehensive and may include some inapplicable listings. Key words for search were: hunger, malnutrition, nutrition, food security, food insecurity, photosynthetic, photosynthesis, diet, SNAP. Known omissions at this point include research on animal nutrition and genetics.

Project Title	Lead Unit	Anticipated Total	Start Date	End Date
Feed the Future Malawi Strengthening Agriculture and Nutrition Extension Services Activity	Agr & Cons Econ	\$15,000,000	2015	2020
Illinois Supplemental Nutrition Assistance Program Education (SNAP)	Illinois Nutrition Education Prog	\$12,785,288	2016	2017
Innovation Lab for Soybean Value Chain Development in Africa	Agr & Cons Econ	12,000,000	2014	2018
RIPE - Realizing Increased Photosynthetic Efficiency for Sustainable Increases in Crop Yield	Institute for Genomic Biology	\$11,910,751	2012	2017
Gender and Nutrition Integration Associate Award (GNIAA)	Cons HBIEH PEM	\$7,000,000	2014	2018
Abriendo Caminos2: Clearing the path to Hispanic children’s health with a community-based extension curriculum and university experiential learning.	Hum Dev & Fam Std, Extension, Fam Resil Cntr	3,700,000	2015	2020
Engineering Hydrocarbon Biosynthesis and Storage with Increased Photosynthetic Efficiency	Institute for Genomic Biology	\$2,664,000	2012	2017
Scalable Decision Model to Achieve Local and Regional Resilience of Interdependent Critical Infrastructure Systems and Communities	Civ and Env Eng	\$2,500,000	2016	2020
Synergistic Effects of Exercise and Nutrition on Cognition and Brain Health of Older Adults: A Randomized Controlled Trial	Beckman Institute	\$2,495,272	2012	2017
Microbes, Diet, and Hominin Evolution: Comparative and Metagenomic Approaches	Institute for Genomic Biology	\$2,449,417	2009	2016
The Effects of Fortified Nutritional Supplementation on Cognition, Memory, and Achievement	CNLM - AHS	\$2,261,636	2012	2017
Overcoming Nutritional Immunity: Staphylococcal Adaptation to Host-Imposed Manganese and Zinc Starvation	School of Molecular & Cell Bio	\$1,869,215	2016	2021
CNH: An Ecological Trap for Parasites and its IMpacts on Human Disease Risk, Nutrition and Income	Entomology	\$1,500,000	2013	2017
Enhancing Learning and Memory in the Aged: Interactions between Dietary Supplementation and Exercise	Beckman Institute	\$1,450,542	2012	2016
Nutritional Intake, Cognitive Function, and Measures of Brain Aging	Beckman Institute-	\$1,315,148	2012	2017
STRONG Kids 2: A Cells-to-Society Approach to Nutrition in Early Childhood	HDFS - Family Resiliency Center-	\$1,068,756	2012	2017

The Next 150 Food Security Strategic Plan Task Force

Project Title	Lead Unit	Anticipated Total	Start Date	End Date
Dietary Supplementation with Flax as a Therapeutic Approach for Leiomyomas	Animal Sciences	\$436,150	2016	2018
IWYP - Realizing Increased Photosynthetic Efficiency to Increase Wheat Yields	Crop Sciences-U	\$294,351	2016	2018
Summer Food Hub Cross-Site Evaluation. Feeding America.	Family Resi Cntr; HDFS	\$162,000	2015	2018
Phloem Loading as a Driver of Plant Photosynthetic Responses to Carbon Supply	Plant Biology	\$160,523	2015	2017
Evaluating the Impact of Livestock Development on Poverty and Malnutrition	Agr & Cons Econ	\$142,090	2012	2018
Hunger Free Summer Hub	Human Dvlpmt & Fam Studs	\$106,789	2015	2018
Alliance for Food Security through Reduction of Postharvest Loss & Food Waste	Agr, Cons, & Env Sci	\$70,090	2014	2018
Evaluating the a Multi-Modal Community Nutrition Education Modal within SNAP-Ed and EFNEP (Phase 2)	Coop Extension	\$50,000	2016	2017