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

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Food Systems for Nutrition Innovation Lab

Year 1: Annual Report

October 1, 2021 – September 30, 2022

Tufts Friedman School of Nutrition Science and Policy

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Tufts UNIVERSITY | GERALD J. AND DOROTHY R. Friedman School of Nutrition Science and Policy

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Management Entity Information

Tufts University's Friedman School of Nutrition Science and Policy is the Management Entity (ME) for the Feed the Future Food Systems for Nutrition Innovation Lab (hereafter called FSN-IL). The FSN-IL's core activities are funded under cooperative agreement 7200AA21LE0001 from the United States Agency for International Development (USAID).

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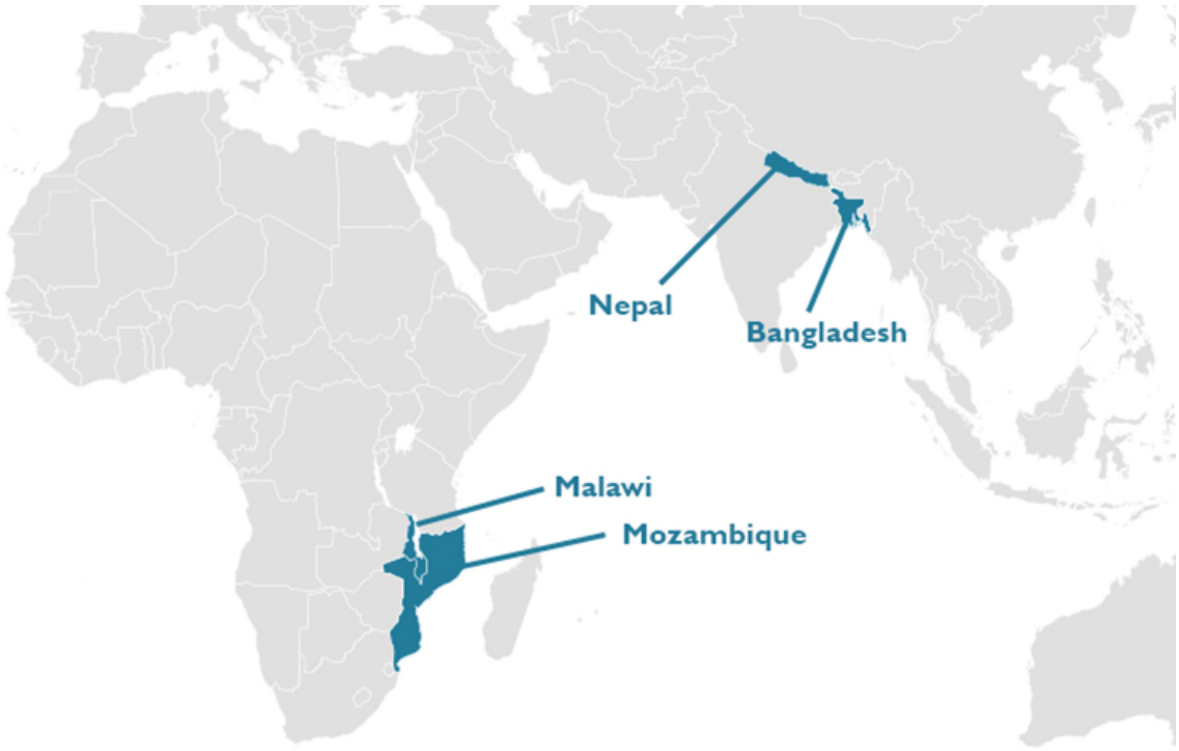
Map of FSN-IL's Current Target Geographies



Acronyms

AFE	Action for Enterprise
AIHEC	American Indian Higher Education Consortium
AOR	Agreement Officer's Representative
ASAT	Agricultural Sustainability Assessment Tool
BD4FS	Business Drivers for Food Safety
BIFAD	Bureau for International Food, Agriculture and Development
CCT	Cross-cutting Themes
CoP	Community of Practice
COVID-19	Coronavirus Disease 2019
CSO	Civil Society Organization
DIV	Development Innovation Ventures
EMMP	Environmental Mitigation and Monitoring Plan
FAO	Food and Agriculture Organization of the United Nations
FLW	Food, Loss and Waste
FS	Food Systems
FSN-IL	Food Systems for Nutrition Innovation Lab
FTF	Feed the Future
GAIN	Global Alliance for Improved Nutrition
GFSS	Global Food Security Strategy
GHG	Greenhouse Gas
HACU	Hispanic Association of Colleges and Universities
HICD	Human and Institutional Capacity Development
HKI	Helen Keller International
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IEE	Initial Environmental Examination
IFPRI	International Food Policy Research Institute
IFSS	Innovative Food System Solution
IL	Innovation Lab
LMIC	Low and Middle-Income Countries
ME	Management Entity
MENA	Middle East and Northern Africa
MSP	Market Systems and Partnerships
NCBA/CLUSA	National Cooperative Business Association/CLUSA International
NGO	Non-Governmental Organization
NIH	National Institutes of Health
R4D	Research for Development
RFA	Request for Application
RFP	Request for Proposal
RFS	Bureau for Resilience and Food Security
SDG	Sustainable Development Goal
SME	Small and Medium-Sized Enterprises
SOW	Scope of Work
STEM	Science, Technology, Engineering, and Mathematics

SUN	Scaling Up Nutrition
TCA	True Cost Accounting
ToR	Terms of Reference
TCUs	Tribal Colleges and Universities
UN	United Nations
UNFSS	United Nations Forum on Sustainability Standards
USAID	United States Agency for International Development
WFP	UN World Food Programme

List of Program Partners

- The 1890 Universities Foundation
- Action for Enterprise (AFE)
- American Indian Higher Education Consortium (AIHEC)
- Arizona State University, Swette Center
- California State University, San Bernardino
- Global Alliance for Improved Nutrition (GAIN)
- Harvard T.H. Chan School of Public Health
- Helen Keller International (HKI)
- Hispanic Association of Colleges and Universities (HACU)
- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
- International Food Policy Research Institute (IFPRI)
- Johns Hopkins University
- Michigan State University
- National Cooperative Business Association/CLUSA International (NCBA/CLUSA)
- Purdue University
- Texas A&M University (Borlaug Institute)
- Tuskegee University
- University of Colorado School of Medicine
- World Vegetable Center

I) Executive Summary

The Food Systems for Nutrition Innovation Lab (FSN-IL) is a five-year activity supported by the USAID Bureau for Resilience and Food Security (RFS) and managed by Tufts University that aims to generate new evidence and disseminate promising technologies and practices supporting uptake of food system innovations at scale. FSN-IL integrates efforts across three domains to i) generate new research for development (R4D) while also effectively disseminating existing, but under-used, ready-to-use, pipeline-ready innovations; ii) support human and institutional capacity development (HICD) in partner countries and in the US aimed at promoting capacity to understand R4D and promotion of innovations; and iii) engage widely across public and private sectors to catalyze uptake of innovations, share lessons on discovery-to-commercialization processes, and build expert resources, networks and partnerships to support local solutions and critical development outcomes. Actions across the three activity domains aim to enhance nutrient density, ensure food safety, and prevent food loss and waste, thus contributing to reductions in poverty, improved diet quality, nutrition, and resilience. The FSN-IL collaborates with its consortium partners while fully engaging with the wider academic, business, and policy communities at global and regional levels, ensuring close engagement with the priorities and interests of target geographies.

In this first year of the award, the ME successfully kicked off its project activities by establishing formal working relationships through subawards with 19 consortium partners. Several individual and small group virtual meetings were held, along with an introductory webinar to introduce the Food Systems for Nutrition Innovation Lab to a wider stakeholder network. This year, the ME successfully identified the first four focus countries (Bangladesh, Malawi, Mozambique, and Nepal), and developed and implemented five separate scoping exercises to identify, develop and inform the design and prioritization of R4D, HICD, and engagement activities by engaging with the consortium partners, other network partners, and thought leaders across a variety of institutions and business networks. As a result, five scoping reports with a census of over 500 innovations across the food systems domains were identified, out of which more than 250 innovations were prioritized.

One of the biggest highlights of the scoping activity was the successful engagement strategy for the scoping exercises that allowed for efficient collaboration among the technical experts from the 19 global partners. The ME also interacted with representatives from US-based institutions to discuss the strategy for convening the US-based institutions cross-consortium working group. Additionally, throughout the year, the ME actively participated and engaged with the community of practice (CoP) on food loss and waste (FLW), and interactions with Missions in Bangladesh, Nepal, Malawi, Mozambique, other Feed the Future Innovation Labs, business networks, private sector and development partners were held. Twenty presentations and two webinars were conducted during the year, and reports and monthly updates were provided to USAID representatives.

Moving forward, FSN-IL aims to build on the successes of the scoping exercises in Year 1 to develop and implement activities in Year 2. The activities will begin with external consultations and feedback on the scoping and distillation of findings, finalization of the report, R4D, HICD and engagement strategy that will serve as a road map for FSN-IL activities.

Mission concurrence has been obtained and FSN-IL initiated contacts with the Missions for initial discussions on implementing FSN-IL activities in Nepal, Bangladesh, Mozambique, and Malawi. Two meetings have been held with the Mission in Nepal and one each with Bangladesh, Mozambique, and Malawi. FSN-IL has

prioritized other focus countries which may be added on later in the project period. While FSN-IL will emphasize R4D and HICD activities at the country level, stakeholders will be engaged across regions as well as globally. Opportunities to collaborate with other existing or new initiatives focused on food system transformation will be sought. FSN-IL will follow the lead of USAID/RFS to determine opportunities for buy-ins and associate awards that will support our core activities

II) Research Program Overview

The Food Systems for Nutrition Innovation Lab (FSN-IL) seeks to generate new evidence and disseminate promising technologies and practices that can support the uptake of food system innovations to improve incomes, diet quality, resilience, and nutrition. FSN-IL will design and manage an integrated effort across three interlocking activity domains to i) generate new **research** for development (R4D) while also effectively disseminating existing but under-used, ready-to-use, pipeline-ready innovations; ii) support human and institutional **capacity development** (HICD) in partner countries and in the US aimed at promoting capacity to understand R4D and promotion of innovations; and iii) **engagement** across public and private sectors to catalyze uptake of innovations, share lessons on discovery-to-commercialization processes, and build expert resources, networks and partnerships to support local solutions and critical development outcomes. Appropriate actions in the inter-connected activity domains will contribute to a range of development outcomes, including improved diets and nutrition, poverty reduction, enhanced sustainability of food systems, and resilience.

FSN-IL Activities

The three FSN-IL activities are elaborated below.

Activity 1: Research for Development (R4D)

Effective R4D draws on the growing suite of potentially applicable solutions, translating evidence to adoption of best practices tailored to user needs. While numerous technologies, products, and practices have been successfully piloted in agriculture, storage, and processing, scaling them up to wider adoption and replication has proven challenging. For example, innovators have not always engaged with the scaling process and potential promoters and adopters have not sufficiently engaged with R4D processes. Simultaneously, there are challenges faced by researchers who are involved in agriculture technology innovations to identify options most likely to support improvements in nutrition outcomes. As a result, significant gaps remain between investments in research and the "last mile" of the discovery-to-impact process.

Activity 2: Human and Institutional Capacity Development (HICD)

HICD actions through the FSN-IL will bring benefits to low- and middle-income countries (LMICs), U.S. institutions, development partners, and business networks. FSN-IL will establish a strong cadre of LMIC-based professionals with advanced competencies and skills, support local youth- and women-led small and medium-sized enterprise (SME) innovations and strengthen organizations and networks in which these individuals are embedded. This strategy will include HICD initiatives that are academic and non-academic in nature.

Activity 3: Engagement

Stakeholder engagement is fundamentally necessary throughout the discovery-to-impact process. Findings from R4D and insights derived from HICD will be disseminated in ways that promote awareness of and interest in nutrition-sensitive food system (FS) innovations. Uptake will be promoted by actively engaging with private sector hubs and business associations that link suppliers, retail competitors, regulators, and other influential market stakeholders.

Theory of Change and Impact Pathway(s)

Many technology and practice innovations already exist relating to food production, but few focus downstream on nutrition-sensitive markets and businesses, resilience, technology uptake, and the role of youth and women in enhanced value chain impacts. While the set of potential solutions grows, translation of evidence is lagging. The rationale underpinning the FSN-IL's proposed strategy is that stronger evidence and more effective dissemination are needed for technologies, products, ingredients, packaging, processes, storage, marketing, and consumer promotion of nutrient-rich foods, many of which are of higher value and more perishable than staple grains and tubers. The FSN-IL theory of change is based on effective integration of efforts and resources across the three principal domains of activity and is outlined in Figure 1.

For R4D, the theory of change involves three key steps supporting transmission of i) "on-the-shelf" and/or "potential" nutrition-sensitive solutions (technologies, evidence, practices) to ii) potential users, leading to iii) wide adoption, with clear benefits to ultimate beneficiaries. Along this pathway from discovery to impact, FSN-IL will identify candidate solutions, prioritize options for real-world testing or further adaptation, establish rigorous evidence on feasibility, costs, and potential benefits along the value chain, disseminate findings, and document scalability. HICD includes activities that support both LMIC and U.S. institutions and stakeholders and raise capacities to generate and transfer knowledge, technologies, and practices for nutrition-sensitive food systems. Engagement will involve wide-ranging activities that will aim to enhance in-country academic, business and policymaker understanding of, and interaction with, relevant R4D and HICD activities while engaging regional and global stakeholders.

Figure 1. Food Systems for Nutrition Innovation Lab's Theory of Change Framework

Through active engagement with diverse categories of stakeholders, the FSN-IL will facilitate R4D and HICD to support the uptake of best practices and innovative nutrition-sensitive FS technologies. Figure 1 illustrates the interlocking nature of principal activities and feedback loops, their cumulative effects, and the overall process by which the generation of novel results will support scaling of nutrition-sensitive FS solutions.

III) Research Project Reports

Activity 1: Scoping Exercises and Consultations

The overall intent of the scoping exercises and consultations pursued in Year 1 was to a) generate a preliminary census (identifying and listing) of innovations relevant across the food systems, b) assess the technical viability, potential for scaling, and feasibility of such innovations in the real world, and c) help prioritize 'best bet' innovations for possible funding under upcoming FSN-IL calls for research for development proposals. The scoping exercise will allow the ME to generate a robust strategy for R4D, understand HICD needs, and understand the stakeholder landscape and type of engagement that will be critical for the success of FSN-IL actions in the focus geographies.

The approach and process of the scoping exercise is illustrated in Figure 2. The approach and process were applied to all five thematic scoping exercises.

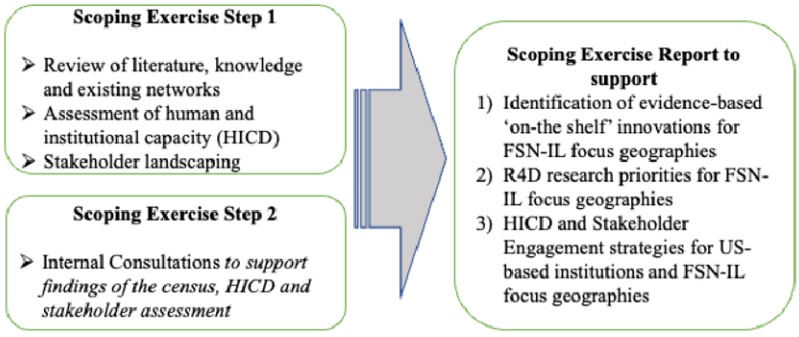


Figure 2. FSN-IL Scoping Exercises: Approach & Process

Step 1 involved activities focused on development, implementation, and completion of the scoping exercise. This included setting up of working groups composed of thought leaders and experts from across the FSN-IL consortium, generating an innovation census for existing innovations, within the context of thematic, cross-cutting and priority areas, conducting innovation prioritization using the Innovation Prioritization Tool, identifying gaps and human and institutional capacity needs to support upscaling and adoption of innovations within the context of focus geographies, and defining the stakeholder landscape around the innovations within the context of focus geographies. This process was successfully completed in Quarter 4, 2022 (September 7, 2022).

Step 2 involved regular internal consultations with scoping working group partners, the ME, and thought leaders and technical specialists. While this activity is listed as step two, the consultations co-occurred in an

iterative, coordinated, and collaborative process, led by the lead institutions from each theme. This process was successfully completed in Quarter 4, 2022 (September 7, 2022).

Step 3 involved finalization of scoping exercise outputs. This included a final scoping report for each theme, a completed list of innovation censuses, prioritized innovations, HICD needs assessment, and a list of stakeholders (by focus countries). The scoping reports and outputs of the scoping exercise will be finalized after the completion of the external consultation with USAID Missions and regional bureaus, government stakeholders, private sector networks, and development partners, to provide opportunity for feedback on the findings and prioritization of value-added research through external consultation. This process is ongoing and will be completed by Quarter 1, 2023.

Activity 1.1: Development of Scoping Exercise Outline

Between quarters 1 and 2 of Year 1, the ME engaged with its consortium of partners, USAID, and technical specialists at Tufts to identify FSN-IL's priority areas, thematic areas, and cross-cutting themes (CCT) across the food system for nutrition. Five thematic areas were identified, as well as three cross-cutting themes, that address priority areas (Figure 3).

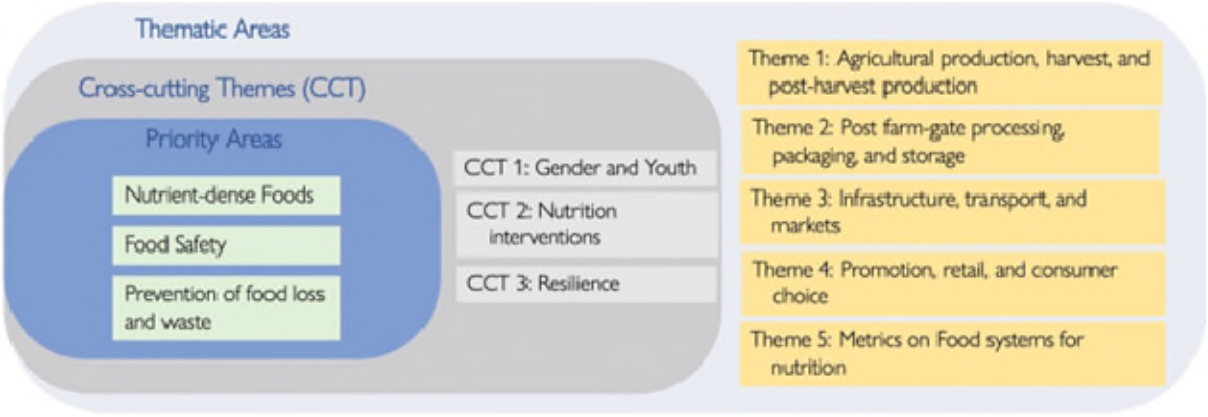


Figure 3. FSN-IL Thematic Areas, Cross-cutting Themes, & Priority Areas

Following the identification of thematic, cross-cutting, and priority areas, the ME then developed and implemented a survey to 1) guide the development of the scoping exercise and 2) gauge the interest and capacity of the consortium partners to undertake work on scoping. All consortium partners successfully participated in the survey. Based on the responses, the ME successfully identified five partner institutions as the scoping leads. The remaining consortium (14 institutions) were assigned to each of the five thematic areas based on their expressed interest and subject expertise. A total of five working groups, one for each thematic area, were formed that comprised a lead partner institution and five to six thought leaders/contributors to provide technical input and support to the lead institution. On the ME end, Patrick Webb (Project Director), Shibani Ghosh (Associate Director), and Robin Shrestha (Project Manager), and other Tufts-based faculty contributing to FSN-IL, were assigned to all working groups to provide technical oversight and facilitate coordination and collaboration within and across the thematic working groups. A complete list of the five working groups is provided in Table 1.

Table 1. FSN-IL Working Groups by Thematic Areas

FSN-IL Thematic Area	Lead Consortium Partner	Lead FSN-IL ME	Consortium Partner Contributors	Tufts University Contributors
Theme 1: Agriculture production, harvest, and post-harvest losses (on farm)	Purdue University	Patrick Webb	Texas A&M University (Borlaug Institute)	Erin Coughlan de Perez
			Helen Keller International (HKI)	
			International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)	
			Michigan State University (MSU)	
			National Cooperative Business Association/CLUSA International (NCBA CLUSA)	Robin Shrestha
			The 1890 Universities Foundation	
			American Indian Higher Education Consortium (AIHEC)	
Theme 2: Post farm-gate processing, packaging & storage	University of Colorado	Shibani Ghosh	Arizona State University (ASU Swette Center)	Patrick Webb
			Global Alliance for Improved Nutrition (GAIN)	
			Purdue University	Robin Shrestha
			Tuskegee University	
Theme 3: Marketing and distribution-infrastructure, transport & markets	Action for Enterprise (AFE)	Patrick Webb	Arizona State University (ASU Swette Center)	Will Masters
			Helen Keller International (HKI)	Robin Shrestha
			International Food Policy Research Institute (IFPRI)	
Theme 4: Food Environment, consumer choice, retail promotion	Global Alliance for Improved Nutrition (GAIN)	Shibani Ghosh	California State University, San Bernardino (CSUSB)	Eileen Kennedy
			Helen Keller International (HKI)	Katie Stebbins
			World Vegetable Center	Robin Shrestha
Theme 5: Nutrition Metrics	Harvard University	Shibani Ghosh	International Food Policy Research Institute (IFPRI)	Will Masters
			Johns Hopkins University	
			Michigan State University (MSU)	Robin Shrestha
			Boston Children's Hospital	

Concurrently, the ME developed and finalized the scoping outline, methodology, and templates for a scoping report, innovation census and prioritization, HICD assessment, and stakeholder analysis. The outline and methodology provided detailed information and step-by-step instructions on the scoping activities, which included 1) a census of innovations by thematic area, 2) innovation prioritization by thematic area, 3) stakeholder mapping by thematic, priority areas, and focus geographies, and 4) assessment of HICD by

thematic, priority, and focus geographies. Templates for census and innovation prioritization were developed and shared with the working groups for feedback prior to finalizing. A timeline, terms of reference (ToRs), and scopes of work (for scoping leads and contributors), including deliverables of the scoping exercises, were finalized. The final outputs of the scoping exercise included: a) a scoping report, b) a census of potential innovations (technology, tools, practices, approach), c) a list of prioritized innovations for R4D, d) a list of identified stakeholders by priority areas and focus geographies for the FSN-IL engagement strategy, and e) a list of priority HICD needs and activities by priority areas and focus geographies that will contributed to FSN-IL's overall HICD and engagement strategy.

For successful implementation of the scoping exercise, the ME worked closely with the Piestar technical team to develop a collaborative knowledge management platform for the scoping exercise. The platform offered working groups a collaborative platform to share technical inputs and feedback within and across the working groups, share regular weekly and bi-weekly updates on the progress with the ME, and a central repository to share resources (journal articles, success stories, case studies, weblinks) that informed the scoping outputs. Prior to implementation, a working session was held between the ME and the scoping lead institutions (Purdue - Theme 1, University of Colorado -Theme 2, AFE – Theme 3, GAIN - Theme 4, and Harvard university – Theme 5) in March (Quarter 2).

Activity 1.2: Undertaking Scoping Exercises

The scoping exercises for the thematic working groups took place between May-August 2022. The scoping exercises were led by each scoping lead institution in collaboration with a working group of consortium partners. Several project partners contributed to more than one theme.

Within each thematic group, virtual working meetings were convened to discuss the aims and objectives of the group, identify components of the scoping exercise, and identify food systems frameworks in use, as well as develop timelines and next steps for the scoping exercise. Contributors indicated their area(s) of interest and expertise and were assigned to specific areas of the food systems framework in line with that expertise. Inputs from each partner were discussed, further refined, and then fed into the broader overall scoping reports for each theme.

Consortium partners engaged with the scoping exercise by: a) participating in research and planning meetings, b) contributing to food systems innovation surveys and write-ups of prioritized innovations relevant for each theme, c) contributing to innovation censuses and prioritization of innovations, stakeholder analyses and mapping for priority geographies and HICD assessments, and 4) providing feedback on draft reports, prepared by lead partners. The activities undertaken by each thematic working group are listed below:

1) Compile a census of innovations:

Each working group assessed existing innovations (technologies, practices, processes) that are "on-the-shelf" but have not yet been adopted at scale across the value chain segment of the food system. The working groups for each theme identified, enumerated, and specified the degree of 'readiness' for deployment of innovations at scale in the innovation census sheet provided by the ME.

2) Prioritization of innovations:

Following the census of innovations, each working group conducted a prioritization of innovations, utilizing an Innovation Prioritization Survey tool, adapted by the ME from USAID's Agricultural Sustainability Assessment

Tool (ASAT) with a set of criteria to guide the prioritization activity. The Innovation Prioritization Survey Tool was linked with the innovation census, and only innovations with evidence of an innovation's effectiveness, or commercial viability, were included in the prioritization portion of the scoping exercise.

3) Assessment of HICD needs:

The five thematic working groups performed an assessment of HICD needs (curricula, courses, trainings) to better address and support the research, adoption, and scale-up processes of innovation (both academic and non-academic) across the food system in focus geographies.

4) Stakeholder landscape analysis:

Similarly, a stakeholder landscape analysis in focus geographies and potential for engagement was performed by the working groups.

A summary of achievements accomplished by each thematic working group is provided below:

Theme 1: Agriculture production, harvest post-harvest losses (on farm)

Purdue University (Lead), Texas A&M University, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Michigan State University, National Cooperative Business Association/CLUSA International (NCBA/CLUSA), The 1890 Universities Foundation, and American Indian Higher Education Consortium (AIHEC)

Led by Purdue University, the Theme 1 working group began the scoping exercise by performing a desk review of known or existing innovations relevant to the thematic area resulting from consultations with relevant stakeholders. Included in this were phone and email-based surveys soliciting project information from 1890 Universities, and an email-based survey by the American Indian Higher Education Consortium of its 35 land-grant tribal colleges and universities asking for models of innovative food and nutrition research, teaching, and community outreach. Work was then organized according to major topical areas, i.e., sub-domains within Theme 1.

Five innovation sub-topics were identified (inputs, staples, horticultural crops, animal-sourced foods, and post-harvest handling/storage). Acknowledging obvious overlaps in subject matter, each sub-topic was assigned to separate individuals on the lead partner team. All thematic partners were asked to self-identify their interest related to sub-topics to focus efforts and draw on specific expertise. Work was not siloed, however, and at all steps all consortium partners were invited to contribute expertise in any area.

A complete innovation census database was compiled consisting of 153 entries deemed relevant to Theme 1. Entries in this comprehensive database included innovations with incomplete information that would be needed for further assessment and scoring during the prioritization and ranking stage. The census identified farm-level innovations relevant to the theme and topic, focusing on those that are potentially promising, impactful, and scalable, some of which may already be deployed in one setting and are ready to move/test elsewhere, or may be at proof-of-concept stage and ready for testing in the field.

A short-list of innovations was created consisting of 63 entries for prioritization. These were moved forward for numeric scoring and ranking using the Tufts-provided worksheet-based prioritization tool. Assessment of HICD needs and stakeholder mapping for Theme 1 was performed. Feedback was gathered and used to finalize the spreadsheet and was also integrated into the final narrative scoping report.

Theme 2: Post farm-gate processing, packaging, and storage

University of Colorado (Lead), Arizona State University (ASU Swette Center), Global Alliance for Improved Nutrition (GAIN), Purdue University, and Tuskegee University

Led by University of Colorado, the Theme 2 working group convened introductory meetings to introduce the thematic exercise guidelines, roles and responsibilities, and deliverables to the working groups. Based on these discussions, action plans were developed. A comprehensive review of multiple databases was undertaken (Agrilinks, FAO, Web of Science, PubMed, ScienceDirect, and Google Scholar) and the innovation database was shared with partners for input. The working group also engaged with experts at FAO, other USAID Feed the Future Innovation Labs, Food Enterprise Solutions, and Wan-Yuan Kuo, Director of the Food Product Development Lab at Montana State University, to get an overview of innovations on the market and current developments on expertise in processing and packaging, and storage mechanisms.

The research team held five Zoom based meetings with the working group between May 2022 to August 2022. Sixteen contributors for GAIN, University of Arizona, Tuskegee University, and Purdue University, plus four members from Tufts University, were invited to each meeting. Meetings covered discussions about each area of the scoping review with individual meetings designated for each of the three sections. Collaborators provided insights about application of innovations in the field.

A complete innovation census database was compiled consisting of 74 entries deemed relevant to Theme 2, and prioritization was done using the prioritization tool on all 74 entries. The census identified innovations and technologies that improve three post-harvest activities for the promotion of more nutritious and safe foods in LMICs: (1) food processing, (2) packaging, and (3) storage. Independent searches were conducted for the three activities. Searches identified 928 articles related to 'food processing', 277 articles for 'food packaging", and 128 articles for 'food storage'. All articles were reviewed and those that discussed innovations and technologies related to food processing, packaging, and storage were kept for the report. The Global Innovation Development Innovation Database by the Global Innovation Exchange had a total of 7264 rows of innovations that were reviewed. However, most of the innovations in this database did not focus on our focused activities and only 68 potential innovations were identified, and these significantly overlapped with those provided by the Agrilinks search using the terms 'food processing', 'food packaging', and 'food storage'. ScienceDirect, PubMed, Web of Science, MEDLINE and Google Scholar databases, as well as publicly available program reports and studies, policy briefs, e-newsletters released by governmental organizations, development agencies, business companies, and social entrepreneurs were also used to identify an initial list of innovations. Search terms were selected broadly to cover all possible terminologies used to describe both post-farmgate food processing, packaging, and storage and innovations. The scoping report is based on published studies between 2017 and 2022 capturing the latest trends and recent developments in the reduction of post-farmgate loss of nutritious food in the context of the three Cs – conflict, COVID-19, and climate change.

Theme 3: Marketing and distribution-infrastructure, transport, and markets

Action for Enterprise (AFE) (Lead), Arizona State University, Helen Keller International (HKI), and International Food Policy Research Institute (IFPRI)

The scoping exercise for Theme 3 consisted of three components: i) R4D, which included identification and prioritization of on-the-shelf innovations, ii) stakeholder mapping and analysis, which involved the identification, mapping, and analysis of potential stakeholders, taking into account the four focal countries of

Bangladesh, Nepal, Malawi and Mozambique, and iii) the assessment of HICD needs, the final component of the scoping exercise which entailed the identification of local educational institutes in the focal countries with potential to prepare people to take on opportunities/challenges in local Food Systems value chains.

For R4D, the thematic working group under lead partner AFE developed subcategories for Theme 3 innovations (storage, transportation, policy, marketing strategies, etc.). Theme 3 identified and reviewed innovations according to the subcategories and distilled 100+ innovations into a list of approximately 50 (merging similar innovations). AFE conducted an exercise to short-list innovations based on: a) commercial viability in a developing country context, and b) potential contribution to FSN-IL objectives and then applied several filters (application to multiple food types, # of consumer beneficiaries potentially impacted, and conduciveness to integration into private sector and piloting) and applied the census and prioritization (60 criteria) to the 51 short-listed innovations.

For stakeholder mapping and analysis, the working group drafted a generic food products value chain map that includes a depiction of value chain functions and market actors (including those related to Theme 3). This map applies to a diversity of food products and includes references to supporting services such as transportation, import and infrastructure (related to Theme 3). In addition to a list of market actors, AFE developed a list of government entities and donor/development organization programs (related to Theme 3) in each country.

For the assessment of HICD needs, the working group documented studies and programs relevant to Theme 3, conducted a desk review to identify local educational institutes in the four countries of Bangladesh, Nepal, Malawi, and Mozambique that offer similar programs, and developed a preliminary notation of the needs of these local educational institutes with recommendations for field visits to further assess the needs.

Theme 4: Food environment, consumer choice, retail promotion

GAIN (Lead), California State University, San Bernardino (CSUSB), HKI and World Vegetable Center

Led by GAIN, the Theme 4 working group compiled a list of initiatives, summits, portals, and review articles to be reviewed and innovations that could be of interest for Theme 4, and a Google Doc was created and shared with contributors. Small group working sessions were held to screen these sources and compile results. The working group was divided into three subgroups utilizing three approaches to source innovations: i) an academic literature search of a systematic review of the scientific literature, ii) a search of earlier relevant initiatives that had already recently tried to surface game changing food system innovations, and iii) an exercise to capture experts' "top of mind" innovations that they think could be useful.

Structured surveys were used to engage with working group members, first in the initial phase on surfacing innovations, but also later in the follow up on prioritization of the innovation and further assessment of which should be pointed to as "best bets." The surveys were very effective and gave all participants an equal opportunity to provide their input and reflections throughout the process. From the groups involved in the surfacing of innovations, the scoping exercise showed that although innovations in the food environment space are often still 'under the radar' or 'underreported on,' there are quite a large and increasing number of relevant food environment innovations in existence, and using the various complementary search approaches, it was possible to surface quite a large number. Theme 4 applied the census of innovations to 202 innovations and prioritized 81 short-listed innovations.

The subgroup working on the stakeholder analysis and mapping, led by World Vegetable Center, was composed of a group of partners with specific expertise and interest in this work. The group reviewed methods used for stakeholder analysis in the context of food systems and nutrition and mapped them within an existing organizational structure of stakeholder analysis methods. They not only identified relevant stakeholders for the four focus countries, but also designed a "*Protocol for Selecting and Initiating a Stakeholder Analysis Method for Food Systems in Nutrition,*" which can be used for all themes in the next phase of the FSN-IL. As context and local representation and involvement are highly important for the HICD needs, this work was only done for two countries where the lead partner GAIN has local staff available: Mozambique and Bangladesh.

Theme 5: Food Systems for Nutrition metrics

Harvard University T.H. Chan School of Public Health (Lead), IFPRI, Johns Hopkins University, MSU and Boston Children's Hospital

Led by Harvard University, Theme 5 on Nutrition Metrics was different from other themes in that the goal was to assess metrics across the entire food system, not just a single domain. Therefore, early in the process, the working group consulted several food systems frameworks before conducting domain-specific meetings to ensure that all areas were covered without significant duplication of effort.

The working group agreed on the steps to follow in the scoping exercise, including a literature review to identify metrics for each domain of the food system and prioritization of metrics for future use by USAID (i.e., for sending out requests for proposals (RFPs), adoption in the field, future research). The team put a focus on innovative metrics and began to define what constitutes innovative metrics. They also discussed the importance of identifying areas where there are gaps in appropriate metrics. The partners then indicated their areas of interest and expertise and were assigned to specific areas of the food systems framework in line with their expertise.

Working group partners, such as IFPRI, provided extensive input into the metrics table. More specifically, they helped complete the table for several classes of potential outcomes, including those related to affordability of food within the food environment, quality and diversity of diets, nutrition and health outcomes, and women's empowerment. Michigan State University was tasked with deriving metrics related to food quality and safety across multiple domains from farm to fork, so provided a table of such metrics related to detecting and quantitating diverse viruses, bacteria, protozoan parasites, and chemicals and toxins in food. Johns Hopkins was tasked with a) reviewing indicators and metrics related to food loss and waste with a goal to describe the state of the literature related to measuring and assessing FLW, focusing specifically on nutrient-rich foods (vegetables, animal source foods), and b) identifying promising novel indicators and approaches that could be scaled up. Boston Children's Hospital was assigned storage and distribution, hygiene behaviors, and gut health.

Activity 1.3: Internal Consultations

Throughout the scoping exercise period (May-August), thematic group Leads and contributing partners interacted on a regular basis to provide inputs, feedback, and discuss progress, challenges, questions, and concerns in implementing the scoping activity. Lead partner institutions documented effort and shared updates via Piestar and through virtual meetings in both small and larger working groups, that facilitated internal consultations within and across the thematic group partners, the ME, and other technical specialists at Tufts. The internal consultations were conducted to discuss the approach for the scoping review, domains, and sub-categories under each thematic area, as defined by the food systems framework as a starting point,

and outputs of the innovation census and prioritization. Several consultations and follow up meetings were held to identify, categorize, and then prioritize innovations and metrics related to food systems. Coordinated by the ME, several thematic groups also sought inputs from other USAID Innovation Labs (ILs). Inputs were received from over six ILs.

The internal consultations were particularly key in enabling working group members from the first four themes to provide inputs on food systems for nutrition metrics (Theme 5). In this instance, the Theme 5 lead partner, Harvard Chan, ensured that metrics relevant to the interventions and innovations proposed by other thematic groups were included in the scoping report. In addition, consultations were conducted within the AIHEC community, including tribal college and university land-grant faculty and administrators, as well as with AIHEC program directors in science, technology, engineering, and mathematics (STEM), environmental, and student success portfolios. The 1890 Universities Foundation convened the first US-based institutions Student Working Group meeting with Marikis Alvarez from Delaware State University and Tubene Stephen, Head of the Global Food Security and Defense Center of Excellence at the University of Maryland Eastern Shore, to discuss the best way to gather information on 1890 University innovations and how to get US-based Instiitution students more involved in Innovation Lab projects.

Activity 1.4: Finalization of Scoping Exercise Reports

The ME received drafts of the scoping reports from all five thematic working groups by the end of Quarter 4 (September 6, 2022). Review of the reports by thematic area, innovation census, and prioritization sheets, continued through the month of September. While the process of finalizing the report has started, the ME will finalize the scoping reports after feedback is received from the external consultations, which are anticipated to occur in early FY2023.

Activity 1.5 External Consultations

External consultation is an important step in reviewing and finalizing the scoping exercise reports that will inform the design of the R4D strategy, HICD and the engagement strategy and its implementation across the life of the project. External consultations will provide external stakeholders from focus geographies an opportunity to provide feedback on the findings of the scoping report. While the ME had initially planned the external consultations in FY2022, a shift in the timeline to accomplish steps one and two of the scoping exercise meant that the timeline for external consultations has been extended to Quarter 1 of FY2023. The external consultations will be conducted in both an in-person and webinar format in early FY2023.

Activity 2: Research for Development (R4D)

The FSN-IL will close the gap between the ambition for and achievement of scaling of nutrition-sensitive FS solutions in targeted resource-constrained settings. For this, the ME will catalyze rigorous R4D, primarily through openly competed awards. Such awards will include grants for a 2- or 3-year period, depending on the topics considered. This research will complement USAID and other donor-funded projects, safeguard scientific quality, work with appropriate LMIC public- and private-sector institutions, and ensure that outputs and activities are relevant to FS stakeholders. For successful implementation of R4D activities, the ME will focus on developing and implementing a robust Research for Development strategy and program focused on the award of competitive grants. R4D will be pursued through a process of activities as follows:

Activity 2.1 Development of R4D strategy: Using the insights from the scoping exercise, FSN-IL will develop a R4D strategy to identify priority on-the-shelf innovations ready for testing, transfer, and potential upscaling.

Activity 2.2 Development and release of RFA for R4D: This will involve development and release and review of a Request-For-Applications (RFA) for R4D.

Activity 2.3 Implementation of a competitive grants program: This will involve the award of competitive grants/sub-awards.

Activity 2.4 will involve disseminating innovative food systems solutions with the potential for impact at the policy and implementation level. This will include presentations in webinars, in the regional scientific symposium (Asia and Africa), and at local, regional, and international conferences. In addition to peer reviewed publications, dissemination will involve packaging findings for non-research audiences, including USAID Missions and regional bureaus, private sector networks, public and policy stakeholders, and development partners.

Activity 2.5 will involve promotion of awareness and uptake of proven solutions by targeting private sector hubs and associations that link suppliers, retail competitors, regulators, and other influential market stakeholders both in the target countries and across regional and global geographies. To support the dissemination of innovation options and promote private sector-led development, FSN-IL and partner sub-awardees will hold regular 'all hands' meetings to review emerging outputs while planning demand creation and scaling. In the target countries, annual 'innovation marketplaces' (in-person and/or virtual) will be organized or contributed to (some countries have such events already), both to disseminate relevant findings from work globally and to encourage more visibility for local developments in technology, products, and practices going beyond production.

The sections below highlight the activities accomplished in Year 1.

Activity 2.1: Development of R4D strategy

The ME started developing the R4D strategy in Year 1. Upon the review of the scoping exercise outputs, the ME has brought together a list of *innovations* across the food systems value chain that are ready for testing, adoption, transfer, and potential upscaling. The writing of the R4D strategy started in September and is anticipated to be completed by November of Quarter 1 (FY2023).

Since this activity needed insights from the scoping exercise, the overall shift in the timeline of the scoping exercise has delayed the completion of this activity.

Activity 2.2: Development, Release and Review of RFA

The next step involved prioritizing *value-added research* through internal and external consultations, developing Request-For-Applications, and generating *empirical evidence of what works,* where, and for whom through release and award of competitive grants. While the development of the drafts of the RFA is ongoing, the finalization of the RFAs will conclude upon the completion of the external consultations. Release and review of RFAs are anticipated to be completed in Quarter 1, FY2023.

Similarly, activities under 2.3, 2.4, and 2.5, which include implementation of grants, dissemination, and promotion of innovations, will begin upon completion of activities 2.1 and 2.2 above in FY2023.

IV) Human and Institutional Capacity Development

Activity 3: Human and Institutional Capacity Development

Under this activity, FSN-IL will develop a HICD strategy focused on both academic and non-academic capacity development, based on the HICD needs identified through the scoping exercise and external consultations in the U.S., US-based institutions and focus geographies. This includes development and implementation of advanced competencies and skills training such as online learning modules/degree and non-degree courses, workshops on research methods or needs assessments, short- and long-term training opportunities, travel fellowships focused on supporting both focus country nationals and US-based institutions at research conferences, and food systems leadership training for policymakers and parliamentarians.

FSN-IL will undertake the following HICD activities under Activity 3.

Activity 3.1: Development of a HICD strategy focusing on both academic and non-academic capacity development based on the HICD needs identified through the scoping exercise and external consultations in the U.S., 1890s land grant institutions, and focus geographies.

Activity 3.2: Development and implementation of advanced competencies and skills trainings such as online learning modules/degree and non-degree courses, workshops on research methods or needs assessments, short- and long-term training opportunities, travel fellowships focused on supporting both focus country nationals and US-based institutions at research conferences, and food systems leadership training for policymakers and parliamentarians.

Activity 3.3: Assessment and development of courses and curriculum (both US-based institutions and LMICs) around the FS thematic areas. FSN-IL will partner with local academic institutions in LMICs and US-based in the U.S. to promote deep collaboration that can include curriculum enhancement relating to nutrition-sensitive FS solutions.

Activity 3.4: Development and implementation of technology challenges for youth- and women-led SME/startups. These stakeholders will act both as co-creators of new evidence and as one target audience for findings through start-ups, accelerators, and innovation challenges.

Activity 3.5: Develop and conduct regional symposia to facilitate transfer of knowledge, capacities, and learnings to enhance focus country capacities for research and dissemination of FS solutions.

While the HICD strategy did not begin until the final weeks of Quarter 4 this year, the ME has finalized applications for training and travel fellowships. The ME also held discussions with the 1890 Universities Foundation on the start-up of the US-based institutions student working group. After scoping activities are completed, the ME plans to host the first meeting of the US-based institutions student working group in FY2023 to identify curriculum needs, discuss upcoming RFA activities, and participate in external consultations.

Activity 4: Stakeholder Engagement

Activity 4 serves several roles and cuts across FSN-IL's scoping, R4D, and HICD activities, and is fundamentally necessary throughout the discovery-to-impact process. FSN-IL will undertake the following engagement activities:

Activity 4.1: Development of an Engagement Strategy

In Year 1, the main aim under this activity was to develop an engagement strategy that included: 1) an engagement strategy with FSN-IL consortium partners and stakeholders (national, regional, global), 2) engagement with US-based institutions student cross-consortium working groups for R4D & HICD activities, 3) engagement with USAID's Community of Practice to support the agenda on food loss and waste, and 4) engagement with USAID Missions, USAID initiatives and ILs, private sector and agri-businesses, and public extension services on aligning and building complementarity of actions, focusing country policymakers to identify priority innovations ready for testing, transfer, and potential upscaling, and implementing a robust R4D program focused on the award of competitive grants.

Throughout the reporting period, the ME successfully interacted and collaborated with its consortium partners and successfully implemented the scoping exercise. Prior to the implementation of scoping activities, remote/virtual interactions were held between the ME and consortium partners (both as a group and individually) to discuss the overall goals of FSN-IL, the theory of change, and the objectives of the scoping exercise. Several interactions were held by the Scoping Leads with their working group partners and institutions to ensure successful fulfilment of the scoping exercises. The coordinated and collaborative process to bring together technical experts from 19 consortium partner institutions for the scoping exercise was a huge undertaking and one of the highlights of a successful engagement strategy adopted by the ME. The timely deliverable of scoping outputs by all thematic leads and their working groups can be attributed to the continued and collaborative engagement process.

Activity 4.2: Convening US-based Institutions Cross-Consortium Working Group

In Year 1, the ME interacted with representatives from 1890s land grant institutions to discuss the strategy for convening the cross-consortium student working group. The goal of this working group will be to assess and support US-based institution capacities and willingness to contribute to FSN-IL HICD in focus countries, to collect US-based institution ideas on priority R4D topics of focus, and to identify and engage with US-based institution networks and activities of relevance to FSN-IL work. In early April, Shibani Ghosh (Associate Director, FSN-IL) was invited to participate and present the scope and objectives of the FSN-IL at the 1890s Special Session. Following the Special Session, a second meeting was held with the 1890s land grant institution networks in April to discuss a strategy to engage with alternative networks for external consultations upon the completion of the scoping exercises. Upon successful completion of the external consultations and finalization of the engagement strategy, FSN-IL anticipates holding its first US-based institution cross-consortium working group meeting in early Quarter 2 of FY2023.

Activity 4.3: Support USAID's Community of Practice on Food Loss and Waste

Since January (Quarter 2, FY2023), the ME continued to actively participate and engage with the community of practice (CoP) on food loss and waste established by the USAID's Bureau for Resilience and Food Security. The ME aims to utilize the CoP FLW as an important platform for the external consultations to share and receive feedback on the report/outputs post-completion.

Similarly, the ME continued to participate and engage with the CoP on human and institutional capacity building throughout Year 1.

Activity 4.4: Stakeholder Engagement (Activities 4.4.1, 4.4.2, 4.4.3, 4.4.4)

Throughout Year 1, FSN-IL held successful engagement across different stakeholder groups that included interactions with Mission Labs in Bangladesh, Nepal, Malawi, Mozambique, FTF Innovation Labs, business networks, private sector, and development partners.

An introductory webinar titled, "Promoting Nutrition-Sensitive Innovation Across the Food System: Introduction to the Work of the New Food Systems for Nutrition Innovation Lab," was held on April 21st, 2022. The webinar was moderated by Meghan Anson (USAID) and highlighted three distinguished speakers – Shawn K. Baker (Chief Nutritionist, USAID), Patrick Webb (Director, FSN-IL), and Shibani Ghosh (Associate Director, FSN-IL). The webinar was a huge success in introducing the objectives of FSN-IL in the context of global food system priorities and FSN-IL's research and capacity building agenda and highlighted how FSN-IL plans to support the broader objectives of USAID and Feed the Future. The webinar was attended by 148 participants.

On April 25th, 2022, FAO and Tufts jointly held a webinar on the policy and programmatic implications of "True Cost Accounting (TCA) of Food." In this webinar, panelists discussed leveraging the TCA framework to address market failures, as well as the policy and programmatic implications of the TCA across the food system. This webinar was co-hosted by the Tufts Food Systems Initiative and the Feed the Future Food Systems for Nutrition Innovation Lab.

On May 11th, 2022, FSN-IL led a session on the development of an action plan for tackling the Ukraine crisis at the Innovation Lab Directors meeting. The objective of the session was to discuss strategies and solutions related to ensuring safe and affordable production of nutritious foods and efforts to prevent and treat malnutrition within the context of the Ukraine crisis. The areas for discussion included innovations (technologies, practices, processes, and products) to support production of safe and nutritious foods, research and capacity needs in implementing actions/innovations at scale and policy and program responses, and investments needed to support actions/innovations at scale. The session was conceptualized and led by Shibani Ghosh, and included presentations by her, Erin McGuire of the Horticulture Innovation Lab, Elin Torell of the Fish Innovation Lab, Haley Oliver of the Food Safety Innovation, and Timothy Dalton of the Sorghum and Millet Innovation Lab, with key insights on ways forward outlined by Patrick Webb.

FSN-IL also made final preparations for a side-event titled "Evidence Needs to Support Nutrition-Sensitive Innovations in Food Value Chains: Perspectives from South Asia and Southern Africa," to be held ahead of *FAO's Science and Innovation Forum* on October 14th, 2022. The side-event will focus on the evidence needs to support innovation in food value chains for healthy diets and a healthy planet with a focus on South Asia and Southern Africa. Healthy diets produced sustainably require low-and-middle income countries to: a) produce more nutrient-rich foods, b) process and preserve those foods to protect nutrients all the way to the consumer, and c) cut loss and waste of these (more perishable) foods. To achieve this requires an urgent focus on innovation, technologies, and applied science to cost-effectively scale up actions and investments across agri-food systems. Distinguished panels from the government of Bangladesh, Nepal, the private sector (Baliyo Initiative, Nepal), and development partners (WFP, GAIN) will be participating in the side event.

In addition, FSN-IL has been invited to participate in a webinar series organized by National Institutes of Health (NIH) that highlights innovative research on nutrition and food security and health outcomes in global

settings, and identifies lessons learned and opportunities for adaptation in the U.S. The webinar series has been scheduled to commence in October 2022; it is likely that this webinar will occur at the end of Q1 of FY23.

Similarly, FSN-IL engaged with Missions from Bangladesh, Malawi, Mozambique, and Nepal for concurrence from the Agreement Officer's Representative (AOR) to facilitate work in Nepal, Bangladesh, Mozambique, and Malawi in Year 1. Two meetings were held with the Mission in Nepal and one each with the Missions in Malawi, Mozambique, and Bangladesh. All four Missions are keen to receive inputs from the scoping exercises and engage in developing stakeholder relationships in country. This process started in Quarter 2 and continued throughout Year 1.

Overall, the Director and Associate Director have made several presentations to groups internal and external to the Innovation Lab community and USAID in Year 1. These are presented in Table 2.

Table 2. FSN-IL Presentations in Year 1 (Stakeholder engagement)

Presenter	Event	Location	Topic	Date	Audience
Shibani Ghosh	NIL Legacy Event	Virtual	Looking Beyond a Decade of Accomplishments in Nutrition. Panel Discussion	September 16-17, 2021	300
Patrick Webb	UNFSS High-Level Roundtable Event	Virtual	Panel discussion on food convergence innovation, hosted by His Excellency Collen Vixen Kelapile, President of the UN ECOSOC	September 24, 2021	50
Patrick Webb	Feed the Future Innovation Labs Annual Meeting	Virtual	Food loss and waste in post-harvest handling in the context of climate change	September 28, 2021	131
Patrick Webb	Congressional Event for Feed the Future Innovation Labs	Virtual	Nutrition Innovation Lab and future Food Systems for Nutrition Innovation Lab Activities	September 29, 2021	150
Shibani Ghosh	USAID Global Food Security Strategy Event	Virtual	Diet Quality, Nutrition and Inclusion. Updating the Global Food Security Research Strategy: New Evidence and Opportunities.	October 3, 2021	150
Patrick Webb	Meeting with group of Shanghai-based Chinese philanthropists based in Shanghai	Virtual	'The Era of Game Changers'	October 13, 2021	40
Patrick Webb	International Webinar on Nanobiotechnology for	Virtual	Reducing food loss and waste through technology innovation	October 15, 2021	500

	Transforming the Food Processing Sector in India,				
Patrick Webb	Friedman Board of Advisors Meeting	Virtual	Presentation on FSN-IL to Friedman Board of Advisors	October 26, 2021	20
Patrick Webb	Tufts Nutrition Council Meeting	Virtual	Presentation on new FSN-IL award and implications for the Friedman School	November 4, 2021	30
Shibani Ghosh	Annual Meeting of the Food Safety Innovation Lab	West Lafayette, IN	Food Safety and Nutrition	November, 2021	Unknown
Patrick Webb	European Union's Standing Committee on Agriculture Research Meeting	Virtual	The role of science-policy interfaces in food system transformation	December 7, 2021	75
Patrick Webb	Nutrition for Growth Side Event	Virtual	Fireside chat with Shakuntala Thilsted on translating nutrition research to policy and practice	December 14, 2021	40
Shibani Ghosh	Special Session Engaging 1890 Universities in Global Food Security 2022: Association of 1890 Research Directors Research Symposium	Atlanta, GA	The Food Systems for Nutrition Innovation Lab (2021-2026)	April 6, 2022	50
Patrick Webb	Feed the Future Innovation Labs Virtual Partners Meeting	Virtual	Preventing Malnutrition: Key Messages and Insights	May 11, 2022	122
Shibani Ghosh	Feed the Future Innovation Labs Virtual partners meeting	Virtual	Preventing Malnutrition: Introduction and Brief presentation on Action plan for Preventing Malnutrition	May 11, 2022	122
Shibani Ghosh	Cornell Program in International Nutrition Seminar series	Virtual	Nutrition, Agriculture, Health, and Food Systems: Evidence and approaches in addressing maternal and infant nutrition	April 11, 2022	40
Patrick Webb & Shibani Ghosh	1st Food Systems for Nutrition Innovation Lab Webinar	Virtual	Promoting Nutrition-Sensitive Innovation Across the Food System: Introduction to the Work of the New Food Systems for Nutrition Innovation Lab	April 21, 2022	148

Patrick Webb	BIFAD's 184th Open Meeting	Virtual	Key Actions to Prepare for Future Crises	May 23, 2022	179
Patrick Webb	USAID's Community of Practice on Research	Virtual	Priorities for Research in the FSN-Innovation Lab	June 8, 2022	20
Patrick Webb	USAID Feed the Future Jordan Nutrition Innovation Lab First National Scientific Symposium	Amman, Jordan & Virtual (Hybrid event)	Keynote Address: Sustaining Healthy Mothers, Infants, and Children in Jordan: Prioritizing Effective Food Systems Policies and Nutrition Interventions	August 16, 2022	461
Patrick Webb	Micronutrient (MNF) Forum	Virtual	Micronutrients and Resilience	September 6, 2022	12
Shibani Ghosh	Feed the Future Innovation Labs Annual Meeting	Washington D.C. & Virtual (Hybrid)	Identifying innovations to support optimal nutrient density, food safety and/or reducing food loss and waste across the food system	September 21, 2022	137
Patrick Webb	FACT Alliance Meeting at MIT on Convergent Science for Food Systems Transformation	Boston, MA	Keynote Presentation on Diets at the Interface of Human and Planetary Health	September 27th, 2022	60

Moving forward, Regional Fora/workshops and short-term training are planned for FY23.

V) Governance and Management Entity Activity

Activity 5: Governance and Administration

In Year 1, the ME successfully awarded 19 sub-awards, established new partner working relationships, carried out program monitoring and evaluation, reported and responded to AOR, Mission, and other USAID requests, and established financial management processes.

Activity 5.1: Set up of Management Entity Operations

The ME completed the operations setup in Quarter 1. The Director, Associate Director, Senior Program Manager, Research and Capacity Building Manager, and Communications Specialist are all in place, as are faculty members at Tufts University who will provide technical support as requested. The full-time administrative assistant position remains open currently, however, support from an existing administrator within Tufts University remains in place in the interim. There was turnover in the Communications Specialist position in Quarter 3, followed quickly by successful recruitment of a new specialist in Quarter 4 who began working at the end of September 2022.

Activity 5.2: Set up of Consortium

In the first part of the fiscal year, the ME onboarded 19 partners. The process involved working with various departments within each institution, Tufts University, and USAID to prepare, approve and execute final sub-awards. The partners, as stated in the technical approach, will make up a consortium that will play an integral role in the Lab activities.

Once the sub-awards were fully executed, the consortium partners participated in the scoping exercise, which began in June 2022. The partners played an integral role in the scoping exercise during the second half of the fiscal year. The ME is now processing the invoices for each institution and Year 2 work is being determined along with partner collaboration considerations.

Activity 5.3: Communications

As part of the communications strategy, a new FSN-IL website was created and will soon be launched. The last step that remains is to work with the USAID Website Governance Board to go through the approval process for official website clearance. Tufts has provided compliance-and security-related web management details to USAID. New Twitter handles and other social media accounts were established in the first half of the year. FSN-IL is currently working on a flyer and social media promotion for the FAO Science and Innovation Forum side event to be held on October 14, 2022.

Activity 5.4: Project and Knowledge Management

During the FY22 fiscal year, the FSN-IL team completed training sessions on the Piestar knowledge management platform. Throughout the second half of the year, the team spent an extensive amount of time tailoring the platform to FSN-IL reporting needs. In particular, the team worked with the group at Piestar to create a mechanism to allow collaboration across all scoping exercise thematic groups, rename and reorganize reporting modules, input indicators, write training manuals for the partners, and attend ongoing Piestar user meetings. The FSN-IL team plans to continue fine-tuning the FSN-IL Piestar platform into the next fiscal year.

Activity 5.5: Governance Oversight

Fiscal Year 2022 was the launch of the Food Systems for Nutrition Innovation Lab project. The ME spent the first half of the year establishing scopes of work (SOW) for 19 partners and meeting with them individually and in groups to discuss the Lab and the SOW. During the year, partners were also trained and given access to the Piestar knowledge platform site to use for the first activity. During Year 1, 31% of the first tranche of funding was awarded to the partners. In addition, the ME established the FSN-IL Expert Advisory Committee, comprised of esteemed colleagues who were selected and invited based on their relevant expertise. In the last half of the year, partner sub-award compliance and invoice payments were reviewed and processed.

Activity 5.6: Development of EMMP plan

As part of governance and administration, and to ensure compliance with USAID's environmental policies and guidance, the ME will develop an Environmental Mitigation and Monitoring Plan (EMMP) based on Initial Environmental Examination (IEE) determinations that will be a guide for all consortium and sub-award partners. This will be accomplished in Quarter 3 of FY23.

VI) Other Topics

FSN-IL will seek to have a strong voice in appropriate science fora and practitioner dialogues where nutrition FS solutions are being discussed. The FSN-IL will be engaged in global agenda-building exercises including follow-ups on the United Nations Forum on Sustainability Standards (UNFSS), the Global Nutrition Report, Scaling Up Nutrition (SUN) strategic prioritization, the Research Alliance for Climate and Food Systems (based at MIT), and the Nutrition4Growth Summit. FSN-IL will aim to leverage and coordinate with existing or new activities led by partners like Cornell and IFPRI, and by United Nations (UN) agencies, like the Food and Agriculture Organization Office of Innovation.

Expertise within the FSN-IL consortium will be available to in-country stakeholders (policy, program, academia, private sector), USAID Missions, the Bureau for International Food, Agriculture and Development (BIFAD), USAID's Center for Nutrition, and Nutrition Leadership Council. The ME will engage with Agrilinks, the RFS Research Rack up group, USAID Advancing Nutrition, USDA/Purdue Global Agriculture Innovation Forum, USAID's Development Innovation Ventures (DIV), and USAID's Grand Challenges for Development. In addition, FSN-IL will actively collaborate and synchronize with other USAID-funded projects and programs within focus countries and globally. The FSN-IL will continue to work with and expand on close research partnerships with a range of non-USAID funders. An early step will be to alert diverse bilateral and multilateral agencies, as well as foundations, to the launch of this new IL and seek collaboration on key topics.

To support the growth and professional development of minorities and others historically underrepresented in international development, the FSN-IL will nurture broader perspectives, creativity, and institutional change. The ME will establish a cross-consortium working group that will define a series of actions and approaches to optimize US-based institutions engagement in FSN-IL activities, both as providers of expertise and resources and as beneficiaries of sub-awards, capacity-building, and broad stakeholder engagement. Based on such interactions, the ME will map out a five-year plan to guide FSN-IL activities and to define required outputs and outcomes to document impact. The working group will also initiate active engagement with the Hispanic Association of Colleges and Universities (HACU) and 1994 Land Grant institutions.

Multiple channels will be used to tap into networks already in place for private sector engagement including GAIN's global and in-country business networks, the One CGIAR activities, and the SUN Business Network (co-convened by GAIN). GAIN recently launched an Innovative Food System Solution (IFSS) portal to spotlight FS solutions supportive of improved nutrition (https://www.nutritionconnect.org/ifss). The Lab will explore the potential to work closely with the 'Business Drivers for Food Safety' project (BD4FS) which has activities in Nepal. The FSN-IL has started interactions with members of the Tufts Food & Nutrition Innovation Institute, which includes access to more than 60 companies including Danone, Barilla, Ocean Spray, Grupo Bimbo, Food@Google, and Beyond Meat, as well as the business-centric Sustainable Food Policy Alliance. Initial discussions have begun with venture capital businesses including Big Idea Ventures (https://bigideaventures.com/team/). While business environments differ greatly among countries, the FSN-IL will provide a distinctively global approach that draws on the full spectrum of available innovations to achieve Global Food Security Strategy (GFSS) objectives.

Many private sector successes were built on public-sector platforms, not only in the U.S. but also worldwide. Innovation in public service provision includes new approaches to agricultural extension, for example, where reforms have led extension systems to pivot towards encouraging youth engagement and women's

productivity enhancement in FS activities. Expertise from consortium and other collaborators will enable FSN-IL to focus on the right forms of engagement in the right places with the right stakeholders. Local entities of all kinds (public and private) in focus countries will be the primary focus since their full engagement with the FSN-IL agenda is key to ensuring efficiency of all activities, reach, impact, and sustainability.

FSN-IL will be available as a go-to resource for the entire set of ILs, providing scientific guidance and resources relating to research priorities, as well as applied HICD to enhance the nutrition-sensitivity of other IL activities on the ground. An example of this is providing support to the Food Safety Innovation Lab through service on its Technical Advisory Committee. FSN-IL will enhance the visibility and reach of the other ILs' work in R4D on FS solutions by dedicating and linking sections of our own website to other relevant websites across the IL portfolio. The ME will actively work with the ILs as a 'broker' to promote their best buy technologies and engage with relevant streams of mutually supportive research. Another example of engagement with the IL community is through work conducted by our proposed consortium partner, the Tata-Cornell Institute, and its evaluation work for the Crop Improvement Innovation Lab.

VII) Issues

The initial onboarding and setup of 19 partners simultaneously was challenging. Approvals required multiple communications between the partner institutions and the ME throughout a four-month period. For instance, this process necessitated seeking out contacts within each institution who handled subaward agreement processes. These included department administrators, legal counsel, research administrators, and contract administrators, as well as faculty members. The partner setup process ultimately required a great amount of time, and as a result, we learned that the entire, initial ME partner approval process would drive the Activity 1 timeline to the end of FY2022 (August-September).

The five thematic groups each took on one or more critical domains of the food system value chain. This also meant that each thematic working group took slightly different approaches to the scoping activities (that is, the innovation census and prioritization exercise). The ME realized the need for additional time to harmonize the results between the themes. In addition, there are overlaps in innovations identified for one or more themes. Finally, during different internal consultations and discussions with consortium partners and USAID partners, it also appeared that besides prioritization of individual innovations focusing on one specific part of the food system, there are innovations that needed socio-technical bundling between different innovations along/across the food (supply) system. While the ME has initiated a process to compile and bundle innovations, this would stretch the timeline, especially for Activity 2 (R4D) activities.

In Theme 5, a minor issue was that the group often redeveloped the matrices by which they categorized the various metrics and their attributes, because there were a few disagreements about how to organize the different food systems metrics. Not only did they consider metrics across the span of the food supply chain from farm to fork, but they also considered cross-cutting themes such as behavioral, socioeconomic, gender, and accessibility issues. In the end, the group sorted out these different categories satisfactorily. There were minor issues with respect to what to include, for example, a discussion was held on whether to include the gut microbiome as a category, and if so, if current science provides sufficient conclusions about what constitutes a "good" or healthful microbiome composition for the purposes of metrics.

VIII) Ukraine Supplemental Buy-in SOW

The objective of the Ukraine Supplemental buy-in is to advance FTF's food loss and waste agenda and contribute to accomplishing Sustainable Development Goal (SDG) 12.3 to halve FLW by 2030, while also increasing the availability of safe, nutritious foods for consumers, particularly women and children. This work also supports the USAID Climate Strategy target on emissions reduction as it will lower the amount of methane-emitting rotting foods and reduce the demand for increased production by helping bring more food from the farm to consumers.

The FSN-IL buy-in that kicked off on September 1, 2022, will support the following activities:

Activity 1: Technical input on market analysis and opportunity identification, including sharing relevant components of the FY22 scoping exercises. FSN-IL will provide technical input on market analysis and opportunity identification, including sharing relevant components of the FY22 scoping exercises

Activity 2: Development of nutrition-sensitive qualifying criteria and eligibility requirements for applicants. FSN-IL will provide guidance for applying a nutrition-sensitive qualifying criteria and eligibility requirements when reviewing applicant concept notes.

While the activities outlined are broad, FSN-IL has determined based on interactions with USAID and MSP, some specific actions, and activities to engage in this activity, these include the following:

1. Share RFA announcement through the FSN-IL network and with the Innovation Lab Directors Council
2. Provide technical guidance to MSP in ensuring a nutrition sensitive lens is incorporated into the RFA
3. Provide technical guidance on incorporating a nutrition sensitive lens while reviewing the concept notes to the Technical Evaluation Committee (TEC)
4. Identify one representative to participate in the technical evaluation committee and review RFAs. The FSN-IL will participate as a non-voting member but advisory to the voting TEC on which proposals meet the pre-defined criteria as it relates to nutrition and diets

Activity 3: Delivery of 1-2 FLW capacity building workshops. Building on its activity domain focused on Human and Institutional Capacity Development, the FSN-IL will support learning activities that build on the partnership's work described above to ensure that valuable insights are maximized to advance learning and good practice. This includes partnership with local non-governmental organizations to deliver capacity building and training workshops targeted at USAID Mission staff, host government actors, and other local actors such as policymakers, private sector, non-governmental organizations (NGOs), and civil society organization (CSOs) to advance FLW expertise.

Accomplishments

Activity 1: Technical input on market analysis and opportunity identification, including sharing relevant components of the FY22 scoping exercises

This activity is linked to the scoping exercises under FSN-IL's Activity 1. Upon completion of the external consultations and final drafts of the scoping report, FSN-IL will share the outputs with MSP that target post-harvest losses and post-farmgate processing, packaging, and storage.

Activity 2: Development of nutrition-sensitive qualifying criteria and eligibility requirements for applicants

Under this activity, FSN-IL met with colleagues at MSP on September 12, 2022, to support MSP with the dissemination of RFA with FSN-IL networks. MSP provided updates on the RFA and shared a timeline with FSN-IL on activities and areas for collaborative coordination, that include reviewing the qualifying criteria for applicants, ensuring a nutrition sensitive lens in the review of applications as a non-voter member on the Technical Evaluation Committee, and by participating in the co-development process.

Activity 3: Delivery of 1-2 FLW capacity building workshops

Under this activity, initial discussions were held with Thriving Solutions, the implementing agency identified by USAID on delivering capacity building workshops within the MENA region. Three trainings have been proposed by Thriving Solutions: 1) the first training workshop focusing on circular food economy to facilitate the region's food sector; 2) the second workshop focusing on introduction to food loss and waste and the importance of measuring FLW and its application in institutional settings; and, 3) the third training workshop focusing on urban food systems and their linkages to food security, and the key roles of urban cities leading the transformation of the food system to a more sustainable, nutritious, and equitable one.

FSN-IL aims to continue the discussion with USAID and Thriving Solutions to plan 1-2 workshops in FY2023.

IX) Future Directions

FSN-IL will aim to build on the successes of scoping exercises in Year 1 to develop and implement activities in Year 2. The activities will begin with external consultations and feedback on the scoping and distillation of findings, finalization of the report, R4D, HICD, and engagement strategy that will provide a road map for FSN-IL activities, which includes releasing RFAs, conducting HICD activities, and building on the strong foundation of consortium partners, Missions, CoP, host-country stakeholders, etc. for engagement across the focus geographies. A list of future directions is shown below:

1. Finalize the scoping studies and share the long-list and prioritized list of innovations for each theme.
2. Initiate food systems assessments in-country for the Feed the Future focus countries and identify food systems opportunities and constraints, entry points and interventions, sourcing from the innovation census and prioritized innovations from the scoping studies.
3. Have different themes work together to create a shared operational design, reporting template, and presentation – something to make it easy for USAID and implementing partners to look at and utilize across themes.
4. Coordinate with USAID to review and then select among prioritized innovations those they feel would be most conducive to pilot activities in the targeted countries. Requests for Applications will then be issued to potential implementing organizations. Some suggestions related to these next steps include:
    a. In some cases, it might be best to combine several synergetic innovations into one pilot activity, especially if the innovations target the same type of market actor (ex. Food Processing Companies). In this way the implementing organization could manage a program with those market actors that promote several different (and synergetic) innovations at the same time.
    b. Thematic groups provided examples (based on experience implementing similar type initiatives) that could be used to promote the prioritized innovations. It is suggested that these examples be considered when designing the upcoming pilots.

5. Maintain continuity with the Scaling Community of Practice and contribute to project design, especially as related to research on scaling.
6. Explore the possibility of hosting an in-person FSN-IL research symposium on scaling in 2023. This would build upon the Scale Up Conference held at Purdue in late 2018 and the year-long Global Agriculture Innovation Forum that Purdue organized in 2021.
7. Expand on strengths and weaknesses of chosen food systems metrics
8. Finalize the typology of food systems metrics to guide future research and development of metrics
9. Identify gaps where no currents metrics are available, or where current metrics require additional validation
10. Use strengths and weaknesses of metrics to inform prioritization of metrics that USAID should focus on in terms of future research (RFAs) and use in the field to evaluate food systems innovations
11. Identify innovations that are most scalable and develop courses around these
    a. Short courses that could include videos that focus on new technologies
    b. Short courses that could include videos that explain how to implement scaling processes
12. Complete needs assessment at country-level(e.g. drying in Nepal)
13. Moving forward from the stakeholder analysis method selection protocol, pilot the protocol in one or more of the priority countries to establish the effectiveness of the protocol and allow us to revise it for optimal use. In-country partners are likely to gain meaningful knowledge about the relevant stakeholder landscape that can be used as innovations are developed, tested, and taken to scale.
14. There are several technologies and innovations that can contribute to food systems for nutrition. However, several of these innovations have not been scaled. There is a need for generating evidence on the potential impacts of these innovations and strengthening the science-policy interface for supporting effective investment policies and targeting.
15. Make a data-driven case for R4D investment for promoting multi-dimensional and food systems approach to improving nutrition outcomes across the food value chain.
16. There is a need for validated tools and frameworks that can help various stakeholders across the value chains to take the right decisions to achieve sustainable nutrition outcomes.
17. There is a need to consider multiple dimensions to develop sustainable food systems for nutrition:
    a. Designing/promoting farming systems that improve multidimensional sustainability at the household level, considering social, economic, and environmental dimensions
    b. Promoting climate-resilient diversified cropping and farming systems; environmental footprints/greenhouse gas (GHG) emissions of food systems
    c. Assessing the potential of decentralized and local food systems
    d. Preventing food loss and waste
    e. Inclusive opportunities for food value chain actors and agri-businesses
    f. Consumer behavior and its drivers
    g. Convergence of cross-sectoral policies with implications for healthy diets and nutrition.
18. The field of food waste and loss needs better examples of sound primary data collection and analysis of waste and loss related to nutrient-dense commodities from low-and-middle income countries. If RFPs are issued to fund such work, some innovative angles could include:
    a. Conducting waste and loss assessments to inform local action by private/public sector and at the same time informing estimates for SDG reporting
    b. Combining assessments of waste and loss along the food production chain with assessments of other types of information (such as contamination with toxins, etc.)
    c. Developing methods to quantify FLW at different stages, documenting causes and solutions

d. Filling in gaps of waste and loss for commodities that are understudied but nutritionally important (many assessments focus on staple foods)
e. Using digital technologies to conduct waste and loss assessments and making those technologies available to others
f. Studying who benefits from reduction in food waste (testing whether commonly held assumptions that poor consumers benefit when waste is reduced).

Appendix A

FSN-IL U.S. Partner List

U.S. Partner	Institution Type	Project Name	Dates	Funding
Action for Enterprise	Non-government agency	FSN-IL Scoping	4-1-2022 to 9-30-2022	$100,354
Boston Children's Hospital	Healthcare	FSN-IL Scoping	4-1-2022 to 9-30-2022	$14,089
Helen Keller International	Non-government agency	FSN-IL Scoping	4-1-2022 to 9-30-2022	$25,000
The International Food Policy Research Institute	Non-government agency	FSN-IL Scoping	4-1-2022 to 9-30-2022	$25,000
Purdue University	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$100,000
The American Indian Higher Education Consortium	Academic Consortium	FSN-IL Scoping	4-1-2022 to 9-30-2022	$25,696
Johns Hopkins University	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$24,987
1890 Foundation	Foundation	FSN-IL Scoping US-based Institutions Capacity Building	4-1-2022 to 9-30-2022	$50,000
Arizona State University	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$25,000
Cooperative League of the USA dba National Cooperative Business Association	Cooperative Business Association	FSN-IL Scoping	4-1-2022 to 9-30-2022	$24,969
The Global Alliance for Improved Nutrition	Foundation	FSN-IL Scoping	4-1-2022 to 9-30-2022	$99,910
Michigan State University	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$25,000
Texas A&M AgriLife Research	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$24,999
Tuskegee University	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$25,000
California State University	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$25,000
University of Colorado	Academic	FSN-IL Scoping	4-1-2022 to 9-30-2022	$100,000

Appendix B

Success Stories

Success Story 1: Unique and Effective Approach Used that Helped Engage Multiple Partners

Despite working across time zones spanning from Thailand to California - especially on highly complex topics - the partner group was able to mention a wide array of key success relating to approach and collaboration in our project. The partner group mentioned how innovative and engaging the mechanism was to solicit inputs on prioritization, and how the team did an excellent job conducting engaging and effective meetings and exercises that balanced receiving people's input with time commitment. The design and effective prioritization process was reported to be both pragmatic and useful. The team did well in assessing the appropriateness of some exciting innovations with the target populations firmly in mind. Overall, there was a highly involved and engaged group of partners that leveraged external opportunities reaching beyond even the partner group.

Additionally, the team used a very comprehensive approach that combined the literature review and expert inputs (described in detail below). This allowed for a breadth of sources to be covered efficiently in a short period of time. The expert group clearly had wide-ranging experiences from a variety of different backgrounds, contexts, and projects. While there was some evolution in the approach, the ability to successfully cope with it demonstrated both flexibility and mutual trust to meet very tight deadlines. The approach stimulated beyond the theoretical level and into a clear understanding of the impact pathways, challenges, and opportunities that effected real, meaningful change through each idea.

Another key success of this project was the fact that we managed to get a wide group of partners giving valuable input and setup subgroups both for sourcing innovations and on the stakeholder mapping work. For sourcing innovations, we had three subgroups each taking three approaches: i) execute an academic literature search of a systematic review of the scientific literature, ii) search earlier relevant initiatives that had already recently tried to surface game changing food system innovations and iii) capture experts "top of mind" innovations that they would think could be useful.

For the academic literature search the partner team were able to base their effort on work of a GAIN spring term intern from Cornell University. While the contracting phase with Tufts University was still running, the intern started working on the search strategy in collaboration with GAIN knowledge and learning team under the guidance of Matthew Kibbee, Evidence Synthesis & Research Librarian at Cornell University. After agreeing with the team on the final search strategy for the scoping review, Matt ran the search in five different databases (e.g., Web of Science Core Collection and CAB Abstracts), removing approximately 10,000 duplicates using SR Accelerator. The final search result included over 20,000 publications, which were then screened using a systematic review management tool called Covidence. The selected publications (n=1,214) were then transferred to Mendeley, a reference manager software that facilitated clustering of papers by innovations and thematic areas. Collaboration with Matt allowed Theme 4 to conduct a systematic process for searching the academic literature. It also constituted a learning opportunity for most of the team members, who thanks to this experience, are now more familiar with tools and procedures for research synthesis and management.

Related to the subgroup working on searching recent initiatives, GAIN had in the time pre-contract submitted a proposal to Wageningen University for a group of master students to work on the so-called Academic Consultancy Training program, which ran in May and June. The eight students worked closely with the sub team and our existing IFSS innovation team while also being mentored by two coaches. They screened 17 relevant existing initiatives, interviewed several of the partners experts, and even managed develop impact pathways for two example innovations using the IFSS portal back casting tool. As a result, 138 innovations relevant to Theme 4's criteria were considered for further prioritization. This was very fruitful and a great experience on also insuring direct involvement of youth in this project.

Due to the short timeframe and the time zone challenge, structured surveys were used when engaging with partners, first in the initial phase on surfacing innovations, but also later in the follow up on prioritization of the innovation and further assessment of which should be pointed to being "best bets." We found that these surveys were very effective and gave all participants an equal opportunity to provide their input and reflections throughout the process.

The groups involved in the surfacing of innovations also pointed to a success more related to the result of the surfacing: while innovations in the food environment space are often still 'under the radar' or 'underreported on,' the scoping exercise showed that there are actually quite a large and increasing number of relevant food environment innovations out there. Using the various complementary search approaches, we were able to surface quite a large number. In addition, it also showed how portals like the IFSS can be used in very straightforward ways for these purposes. For the future, if we can link the IFSS solutions more to the academic literature, - for example through AI- then it could also greatly facilitate the academic search, which was much more time intensive.

The subgroup working on the stakeholder analysis and mapping was composed of a group of partners with specific expertise and interest in this work. They not only identified relevant stakeholders for the four focus countries, but also designed a "Protocol for Selecting and Initiating a Stakeholder Analysis Method for Food Systems in Nutrition" which can be used in the next phase of the FSN-IL.

Finally, two subgroups were developed to work on the HICD. As context and local representation and involvement are highly important for this, this work was only done for two countries where GAIN has local staff available to be involved: Mozambique and Bangladesh. We found that inputs also did complement the stakeholder mapping work as also described in the above-mentioned protocol where interviews are a means to identify key stakeholders.

Success Story 2: Many "Unplanned Successes" Occurred that Provided New Collaborations and Innovative Ideas Beyond Our Scope of Work

Quantifying the success of an activity is measured against the pre-determined outcomes. In the case of scoping exercise, the FSN-IL team thought that success was achieving the outcome planned; that was, identifying ready technologies to scale up that would potentially impact food systems. However, in this case Action for Enterprise, who served as the lead for Theme 3 – Infrastructure, Transport, and Markets, has identified successes that went beyond the pre-determined ones. These "unplanned successes" should therefore also be counted as successes.

As they reported, AFE was able to identify 51 practical innovations (with several examples of each) that, if promoted, have real potential to impact food safety and nutrition in a sustainable and commercially viable manner. However, AFE and Theme 3 group investigation of "on the shelf" innovations identified the unplanned successes that "are not typically targeted by development programs.

In addition, AFE identified yet another unplanned success during the scoping exercise that could impact global expansions moving forward. FSN-IL has brought together a diverse consortium with a wealth of perspectives, expertise, and experience that has proven to be an asset to this scoping exercise. For AFE, many of the consortium members were familiar only in name. Through the internal consultation process, AFE has gained new potential collaborating partners in other endeavors (beyond FSN-IL) as well as reported benefiting from the unique perspectives offered by the collaboration which fed into the scoping exercise. The collaboration of this group may lead to further expansions globally, proving to be yet another unplanned success.

Speaking to a more tangible success, we can look to the Michigan State University (MSU) for yet another example. During Theme group meetings, Ilana Cliffer brought up the point that, aside from detecting and quantitating contaminants in food, we could propose something similar to what is being done for COVID detection at the community level: detect these foodborne pathogens and chemicals/toxins in wastewater. While there are issues of source attribution (if these contaminants are found in wastewater, are they from food, water, or another source?), and a lack of centralized wastewater management in all our FSN-IL focus areas, it was nonetheless a creative idea of how to assess food safety at the community level. These innovative ideas could have applications well beyond our FSN-IL work to the broader question of how to evaluate microbial and chemical safety – including from food systems – in a community.

Success Story 3: New Innovations Uncovered at Two Tribal Colleges

During the FSN-IL scoping exercise, the working group which involved AIHEC, learned about two innovative programs at their Tribal Colleges and Universities (TCUs) that are now being shared with our partners: (I) The land grant department at Bat Bills Community College and (II) the sustainable agriculture program at United Tribes Technical College surfaced new innovations that will be included into the scoping activity.

The Land Grant Department at Bay Mills Community College operates Waishkey Bay Farm as a teaching, research, and incubator facility focusing on sustainable agriculture and food production that is consistent with traditional Anishinaabek values. Current operations include hoop house vegetable production, hosting a community garden, pasture poultry production, domestic blueberry production, seed saving, managing a small apiary, re-introducing traditional plants for food and medicine, raising grass-fed beef, and industrial hemp research (https://www.bmcc.edu/about-bmcc/community-services/waishkey-bay-farm). It is this cluster of innovations that were presented during the FSN-IL activity.

A second homegrown innovation, the sustainable agriculture program at United Tribes Technical College. This unique innovation develops and delivers curriculum with the goal of teaching students to feed themselves "from seed to plate." At the beginning of the season, students select seeds, plant them in high tunnels, raised beds, and garden plots. They also learn how to transplant seedlings, graft plants onto various roots, grow plants in and out of doors, and utilize multiple watering systems. Along with growing food, students learn traditional foraging. They sustainably forage both food and medicine and learn about various harvesting protocols. They talk to and learn from hunters, fishers, and butchers, and are given the opportunity participate in harvesting and butchering a bison. Students sell produce at local farmers markets

and are taught about value added concepts by using traditional Indigenous preservation methods such as drying, dehydrating, and fermenting. They also learn more contemporary preservation methods such as water bath canning, pressure canning, and freezing. For example, students learn how to preserve the meat and fish through salting, smoking, drying and freezing. Finally, students are taught how to cook all of these amazing foods (https://uttc.edu/academics/programs-degrees/sustainable-ag-food-systems/).

Both innovations were discovered through the scoping and can now be shared to a larger group.