FY2023 SEMI-ANNUAL REPORT
FEED THE FUTURE INNOVATION LAB FOR FOOD SAFETY

Feed the Future Innovation Lab for Food Safety (FSIL)
FY2023 Semi-Annual Report
Performance Period: October 1, 2022 – March 31, 2023

RESEARCH PROGRESS SUMMARY

Research progress made during the reporting period

Management Entity (ME) Objective 1: Maintain high standards in management performance through effective structures, a dynamic and adaptive personnel team, and a culture of open communication within the ME, FSIL research community, and with internal and external stakeholders.

Activity 1.1: Create and maintain effective management structures and practices that promote the success of active FSIL projects

In November 2022, FSIL held its second hybrid annual meeting in San Marcos, Texas, at Texas State University, which is the lead institution for the Bangladesh long-term subaward and a minority-serving institution. The annual meeting was attended by USAID representatives, the FSIL Advisory Committee, FSIL Technical Experts, and subaward project teams. It provided an opportunity for subawards to deliver project updates and receive feedback, fostered collaboration among researchers, and emphasized gender and local capacity strengthening. The FSIL management team also continued to conduct monthly meetings with each subaward team to receive updates and address any concerns. Gender Working Group quarterly meetings were held in December 2022 and March 2023 to provide an opportunity for project researchers working in the gender space to network and collaborate. With data collection underway for all project teams, documentation for Environmental Mitigation and Monitoring (EMMP) was collected and reviewed according to the EMMP plan.

Finally, the FSIL management team commissioned an external performance evaluation, which assessed FSIL's research performance, capacity-strengthening efforts, and overall management strategy. The evaluation report was finalized in March 2023 and shared with USAID, subaward project teams, the FSIL Advisory Committee, and FSIL Technical Experts. The report found that the FSIL management team is highly responsive to the needs of subaward project teams and facilitates effective adaptive management.

Activity 1.2: Develop robust monitoring evaluation, and learning (MEL), communication, and open data platforms

FSIL utilized the Piestar DPx platform to collect and monitor MEL data from subawards. Purdue's Ag Data Services also continued to support subawards with data storage and uploading data to the Harvard Dataverse and USAID's Data Development Library (DDL).

FSIL maintained consistent engagement on Twitter, LinkedIn, and Agrilinks in addition to publishing e-newsletters quarterly. A total of seven stories highlighting project activities, researchers, and FSIL's gender approach were shared during this reporting period.

Activity 1.3: Engage FSIL Advisory Committee and Technical Experts in providing guidance and support to ongoing activities

Members of the FSIL Advisory Committee and Technical Experts attended the annual meeting in person and virtually to provide feedback on each project's progress and to offer recommendations for consideration in project activities. They also engaged in interviews and provided feedback for the FSIL external performance evaluation.

Cambodia Objective 1: Reducing Foodborne Pathogen Contamination of Vegetables in Cambodia: Innovative Research, Targeted Interventions, and Impactful, Cambodian-Led Engagement (Cambodia Long-Term Subaward)

A behavior theory approach has been used to better understand producer and consumer perceptions of food safety, which is critical for influencing the adoption of new behaviors and practices. Using data that was collected with the COM-B (Capability, Opportunity, Motivation > Behavior) survey tool in FY2022, researchers completed data analysis and submitted two manuscripts for peer-review publication. One manuscript was published in Frontiers in Sustainable Food Systems in March 2023, and the second is currently under review. A third analysis identifying statistical neural networks for assessing the COM-B model was submitted for presentation at the Purdue Conference on Applied Statistics in Agriculture and Natural Resources to be held in May 2023. The results from this work are currently being used to develop food safety education programs that incorporate current beliefs and perceptions of barriers to implementing food safety practices.

From the longitudinal study measuring *Salmonella* and *E. coli* contamination of vegetables, data analysis is underway. *Salmonella* and *E. coli* were isolated from samples collected at farms, distribution centers, and markets. The isolates were shipped to Pennsylvania State University, and their identity was confirmed. Whole genome sequencing is expected to begin in April 2023.

Finally, data from a gender analysis based on qualitative interviews previously conducted with women vegetable producers is currently being analyzed, and a second gender analysis using focus group discussions to identify barriers and incentives to adopting different food safety practices is underway.

Bangladesh Objective 1: Enhancing Food Safety in Fish and Chicken Value Chains of Bangladesh (Bangladesh Long-Term Subaward)

The project team continued to make progress towards understanding safety and quality differences between fish raised following safe management practices and those raised under standard practices and the resulting impact on consumer willingness to pay. Rohu fish that were raised on safer feeds and using best management practices were compared to typical market rohu, and the fish raised with safe practices achieved better results based on preliminary sensory, chemical, and microbial analyses. Previous results from tilapia and pangasius fish were also analyzed. Again, the fish cultured under safe management practices had a better appearance and reduced loads of bacteria, heavy metals, and antibiotic residues compared to control fish. Results from experimental auctions held in FY2022 were analyzed, and consumers were consistently found to be willing to pay higher prices for fish raised under best practices. From appearance alone, they were willing to pay an average of 29% and 10% more for tilapia and pangasius, respectively. When laboratory results of bacterial loads were provided, consumers were willing to pay 52% and 39% more. These results were shared at two conferences. In addition, a review paper about fish adulteration and contamination in Bangladesh was published, and a public demonstration and dissemination event was held at the project site in Muktagacha, Mymensingh, to share findings with research, government, and farmer stakeholders.

Kenya Objective 1: Chakula Salama: A Risk-Based Approach to Reducing Foodborne Disease and Increasing Production of Safe Foods in Kenya (Kenya Long-Term Subaward)

Researchers made progress in characterizing *Salmonella* and *Campylobacter* contamination and the effectiveness of a post-harvest carcass wash intervention in poultry value chains managed by women and youth farmers. They worked with The Ohio State University's Institutional Review Board (IRB) to modify protocols as needed, and they expect to receive IRB approval for baseline microbiological surveys in FY2023 Q3. While waiting to receive approval, the team prepared for data collection by finalizing the sampling framework and collaborating with Kiambu County officials, the Ministry of Agriculture, and other stakeholders to identify eligible poultry farms for the study. The team also developed an initial quantitative microbial risk assessment (QMRA) model based on existing literature and models for other parts of sub-Saharan Africa. The model will later be updated based on the microbiological survey and will be used to assess the burden of *Salmonella* and *Campylobacter* in Kenya from consumption of poultry produced by

smallholder farmers and to estimate the impact of the post-harvest carcass wash intervention on hazard concentrations and public health.

To better understand the roles of men, women, and youth in poultry production and their unique food safety risks, a literature review was published in Frontiers in Sustainable Food Systems. IRB approval was also received to conduct a gender analysis, which will begin in FY2023 Q3 and include surveys, focus group discussions, and key informant interviews.

Senegal Objective 1: Food Safety Capacity Building in Senegal: Enhancing Resilience of the Dairy Value Chain by Leveraging Public-Private Partnerships (Senegal Long-Term Subaward)

Two baseline surveys were conducted in Dahra (Louga region) to determine production and processing conditions in the dairy value chain and to inform the development of a comprehensive harmonized survey that included food safety, gender, and youth related topics. The harmonized survey targeted producers, processors, and households and was conducted in Louga, Matam, and Saint Louis. Analysis of the survey results is now underway. In addition, two manuscripts focusing on the production and processing of dairy and their impact on food safety in the dairy value chain were accepted for publication. Two Senegalese graduate students also defended their masters' theses and graduated, and the project began recruiting for three additional graduate students.

Nepal Objective 1: Market-Led Food Safety in Nepal: Harnessing Production Incentives and Consumer Awareness (Nepal Short-Term Subaward)

Data collected from consumer surveys and willingness to pay experiments was compiled, cleaned, and analyzed. Findings regarding food safety awareness and differences by gender were presented at a conference in Nepal and submitted to a peer-reviewed journal for publication. Additional findings regarding food safety knowledge among youth and their affinity to choose safer fresh produce were prepared for a conference paper and presented at a conference in the United States. Findings from *E. coli* testing in household water samples were also tabulated.

The next step in the project was to conduct surveys and collect water samples with growers of fresh produce to complement the data from consumers. The project team collaborated with local organizations and government offices to identify commercial growers in each province of Nepal and to design an appropriate sampling frame and strategy for survey administration. They designed the survey form, trained enumerators and field coordinators, and completed the survey with 1,050 growers representing ten districts and all seven provinces in Nepal. Water samples were also collected from a sub-sample of growers and tested for *E. coli*. Data analysis for both the survey and water testing is now underway.

Nigeria Objective 1: Strengthening Household and Community Food Safety in Nigeria (Nigeria Short-Term Subaward)

In preparation for conducting a household survey on knowledge, attitudes, and behaviors related to food and water safety, the team finalized a training manual and conducted a two-day training session with 22 enumerators. The enumerators then successfully conducted surveys with 682 households in five local government areas in Ibadan, and they collected anthropometric and dietary data from one child under five years of age in each household. Data cleaning from the exercise is underway and will be followed by data analysis. The team also completed preparations for an environmental sanitation assessment. They developed a protocol for conducting the assessment and received IRB approval from Obafemi Awolowo University. They identified which households from the initial survey would also be willing to participate in the sanitation assessment. Finally, they ordered and shipped needed supplies, including supplies donated by Neogen, and Neogen staff conducted a virtual training with researchers at Obafemi Awolowo University on use of the supplies.

Finally, the team prepared for the Our Voice activity, which will allow mothers to visually document their experiences interacting with factors that impact food safety. They identified households willing to participate, translated the Our Voice application into Yoruba, and drafted a protocol for the activity.

Issues or concerns encountered during the reporting period

Project-specific concerns

<u>Kenya</u>

IRB approvals continue to cause delays for the Kenya project. The project team met with The Ohio State University leadership and IRB staff to expedite the review process and resolve outstanding issues, and they subsequently received approval for the gender analysis in February 2023. However, this is still a significant delay from the planned timeline. IRB approval is still outstanding for the microbiological surveys but is expected to be received in May 2023, and the review process for the pre- and post-intervention knowledge, attitudes, and practices assessment is underway. The project team is managing the delays by completing all preparation for field work during the review period so that they are ready to begin as soon as approvals are received.

The team also faced challenges in securing approval from The Ohio State University to ship isolates for whole genome sequencing. They will conduct the sequencing in Kenya instead and are currently making arrangements to have the International Livestock Research Institute (ILRI) perform the work. Despite the delays, the project team anticipates being able to complete the project by March 2024 as planned, but any additional setbacks will need to be avoided.

<u>Nigeria</u>

Uncertainty about political unrest surrounding the February presidential elections led to minor delays in conducting household surveys, but future milestones related to that work are still on track. Currently, the environmental sanitation assessment is on hold pending successful delivery of supplies that were donated by Neogen. The package is being held in customs, and it is uncertain whether the supplies will still be usable when the package is released due to possible exposure to high temperatures during storage. If a new shipment is required, the sanitation assessment will be delayed by several weeks.

HUMAN AND INSTITUTIONAL CAPACITY DEVELOPMENT

A. Short-term training

Country of Training	Brief Purpose of Training	Who was Trained	M	F	Total
Nigeria	Enumerators were trained in data collection	Civil Society	10	17	27
Nigeria	Training of laboratory technicians and researchers on use of 3M Clean-Trace ATP swabs and *E. coli* and coliform aerobic plate counts	Civil Society	6	3	9
Senegal	Enumerators were trained on proper protocols for conducting surveys and collecting data	Civil Society	7	15	22
Nepal	Enumerators were trained in data collection	Civil Society	6	4	10

B. Long-term training

Trainee Number	Sex	University	Degree	Major	Program End Date (M/Y)	Degree Granted (Y/N)	Home Country
1*	F	Purdue University	Ph.D.	Agricultural Sciences Education and Communication	May 2023	N	United States
2*	M	Purdue University	Ph.D.	Agricultural Economics	May 2023	N	United States
3	M	Cornell University	Ph.D.	Food Science and Technology	May 2024	N	United States
4	F	Royal University of Agriculture	M.S.	Agro Industry (Food Microbiology)	January 2024	N	Cambodia
5	F	Royal University of Agriculture	M.S.	Agro Industry (Food Microbiology)	January 2024	N	Cambodia
6	F	Purdue University	M.S.	Animal Science	December 2022	Y	United States
7	M	Purdue University	Ph.D.	Agricultural Sciences Education and Communication	June 2024	N	United States
8	F	Bangladesh Agricultural University	M.S.	Agricultural Economics	October 2022	Y	Bangladesh
9	F	Bangladesh Agricultural University	M.S.	Food Technology and Rural Industries	December 2022	Y	Bangladesh
10	F	Bangladesh Agricultural University	M.S.	Agricultural Finance and Banking	June 2022	Y	Bangladesh
11	F	Bangladesh Agricultural University	M.S.	Microbiology and Hygiene	October 2022	Y	Bangladesh
12	M	Bangladesh Agricultural University	Ph.D.	Agricultural Economics	December 2024	N	Bangladesh
13	F	National School of Agriculture (ENSA)	M.S.	Animal Production	March 2023	Y	Senegal
14	M	National School of Agriculture (ENSA)	M.S.	Value Chain Development, Agriculture & Agribusiness Entrepreneurship	May 2023	N	Senegal

Trainee Number	Sex	University	Degree	Major	Program End Date (M/Y)	Degree Granted (Y/N)	Home Country
15	F	Polytechnic School of Dakar	M.S.	Engineering in the Food Industry	March 2023	Y	Senegal
16**	M	National School of agriculture (ENSA)	M.S.	Value Chain Development, Agriculture & Agribusiness Entrepreneurship	November 2022	N	Senegal
17	F	National School of agriculture (ENSA)	M.S.	Value Chain Development, Agriculture & Agribusiness Entrepreneurship	May 2023	N	Senegal
18	F	Institute of Technology of Cambodia (ITC)	M.S.	Agri-Industrial Engineering	September 2023	N	Cambodia
19	F	KEMRI	M.S.	Medical Microbiology	December 2023	N	Kenya
20**	M	KEMRI	M.S.	Medical Microbiology	December 2022	N	Kenya
21	F	Purdue University	Ph.D.	Agricultural Economics	August 2026	N	Senegal
22	F	Bangladesh Agricultural University	Ph.D.	Microbiology	May 2024	N	Bangladesh
23	F	Bangladesh Agricultural University	M.S	Food Science	December 2022	Y	Bangladesh
24	F	Bangladesh Agricultural University	M.S	Agricultural Economics	March 2024	N	Bangladesh
25	F	Bangladesh Agricultural University	M.S	Microbiology	March 2024	N	Bangladesh
26	F	Bangladesh Agricultural University	M.S	Agricultural Economics	March 2024	N	Bangladesh
27	M	University of Nairobi	Ph.D.	Food Safety and Quality	September 2024	N	Kenya
28	F	University of Dhaka	M.S.	Sociology	August 2022	Y	Bangladesh

*Supported by FSIL for the fall 2020 semester

**Did not complete degree through FSIL

FUTURE WORK

Management Entity

- The FSIL ME will maintain monthly meetings with all subawards to monitor the progress of research activities, troubleshoot issues, and collaboratively develop plans.
- Quarterly Gender Working Group Meetings will continue. The meeting time will be adjusted to be more accommodating for in-country partners, and a topical theme will be added to each meeting to encourage greater engagement by group members.
- The ME will host the third mid-year Virtual Project Exchange on April 24 and April 25, 2023. The event has been redesigned from past years to offer a workshop on a specific theme, rather than focusing only on project updates. Two workshops will be offered—one for the three subawards based in Africa and one for the three subawards based in South and Southeast Asia—and the theme for FY2023 will be local capacity strengthening (LCS). The project teams will conduct a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis related to LCS, assess their project's progress towards achieving their LCS objectives, and compare their project's approach to LCS to the seven principles outlined in the recently released USAID Local Capacity Strengthening Policy.
- A two-part webinar series will be held in June 2023 and focus on risk-based approaches to food safety. The first webinar will provide an introduction to risk-based approaches, and the second webinar will feature case studies where risk-based approaches have been used in Central America, Asia, and Africa.
- FSIL will continue to amplify its communication of project activities and results through web stories, e-newsletters, social media, and Agrilinks.

Long-Term Subawards

Cambodia

- Pennsylvania State University will host a virtual training in whole genome sequencing methods and bioinformatics to all project participants involved in the longitudinal study as well as any interested Cambodian nationals at partnering institutions.
- Dr. Nora Bello (The Ohio State University) will offer in-person training and individual consultations in applied statistical analysis for faculty and graduate students at Cambodia's Royal University of Agriculture and the Institute of Technology Cambodia.
- The first of a series of food safety workshops will be delivered with growers and vendors involved in informal markets.
- Whole genome sequencing will be performed on the *E. coli* and *Salmonella* isolates collected during the longitudinal study. This analysis will provide more detailed information on pathogenicity and persistence, which will allow for strategic planning of food safety interventions.
- Data from the first gender analysis will be analyzed in preparation for submitting a manuscript for peer-reviewed publication.

Bangladesh

- The analysis of antibiotic residues, bacterial pathogens, and heavy metals for fish raised under best management practices versus those raised under traditional practices will be completed.
- Additional experimental auctions will be conducted, focusing on consumer willingness to pay for safer rohu fish.
- Focus group discussions and surveys will be completed to understand food safety knowledge, attitudes, and practices of consumers and other value chain actors, with an emphasis on women-focused groups.

- A willingness to pay survey will be conducted with consumers at fish retail outlets to quantify the impacts of different safety attributes on price. This activity was originally planned as a hedonic analysis, but the number and variety of safe fish products currently on the market in Bangladesh is too limited to quantify the impact of specific safety attributes on price.

Kenya

- Data collection for the gender analysis will be completed, including surveys, focus group discussions, and key informant interviews.
- IRB approval for microbiological surveys and assessment of pre- and post-intervention knowledge, attitudes, and perceptions will be obtained.
- Microbiological surveys will be conducted to establish the baseline prevalence of *Salmonella* and *Campylobacter* in smallholder poultry value chains.
- Pre-training knowledge, attitudes, and practices (KAPs) relevant to the post-carcass wash intervention will be assessed.
- Trainings for the post-carcass wash intervention will be conducted.
- Post-training microbiological surveys and KAPs assessments will be conducted.

Senegal

- Woubit Abebe (Tuskegee University) will conduct laboratory training at the Insitut Sénégalais de Recherches Agricoles (ISRA).
- The harmonized survey data will be analyzed.
- A sampling plan for microbiological assessment of dairy production and processing facilities will be developed.
- The survey data will be used to develop educational materials for actors across the dairy value chain, and trainings will be delivered in collaboration with Food Enterprise Solutions.

Nepal

- Analysis of consumer survey data and water sampling will be completed, and results will be shared through manuscripts and conference presentations.
- Data from commercial grower surveys and water tests will be compiled, cleaned, and analyzed, and results will be shared.
- A model will be developed for consumer willingness to pay for safe produce.
- Progress will be made in developing a food safety training manual.

Nigeria

- Data cleaning for the household survey and child anthropometric and dietary data will be completed.
- Data collection for the environmental sanitation assessment will be completed.
- The Our Voice activity, which will enable mothers to document factors in the household and community which impact their ability to provide safe and nutritious foods to their families, will be completed.
- Initial data analysis will be completed for all three of the above activities.
- In-depth interviews and virtual panel discussions will be conducted to understand the extent to which strategies described in the Nigerian National Policy on Food Safety are recognized and implemented by key stakeholders.

Management Entity: FY2023 Work Plan for the Feed the Future Innovation Lab for Food Safety

Objectives, Activities, and Sub-Activities	Timeline of Activity (October 1, 2022 - September 30, 2023 - FY2023)												Country and Location(s) of Activity	Person or Institution Responsible
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
Objective 1: Maintain high standards in management performance through effective structures, a dynamic and adaptive personnel team, and a culture of open communication within the ME, FSIL research community, and with internal and external stakeholders.														
Activity 1.1: Create and maintain effective management structures and practices that promote the success of active FSIL projects														
1.1.1 Develop and submit semi-annual performance reports, annual work plan, data management plan update, and other required operational documents to USAID	▪					▪			▪		▪		USA	Haley Oliver (Purdue), Randy Worobo (Cornell), Molly Webb (Purdue), Julie Hancock (Purdue), Amanda Garris (Cornell)
1.1.2 Monitor and guide all subaward/project activities through virtual monthly meetings, field visits, and personal correspondence	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	USA/Global	Haley Oliver (Purdue), Randy Worobo (Cornell), Molly Webb (Purdue), Julie Hancock (Purdue), Amanda Garris (Cornell)
1.1.3 Partner with subaward/project teams to identify opportunities to enhance local leadership within the FSIL portfolio	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	USA/Global	Haley Oliver (Purdue), Randy Worobo (Cornell), Molly Webb (Purdue), Julie Hancock (Purdue), Amanda Garris (Cornell)
1.1.4 Monitor implementation of the EMMP; PIs and co-PIs will report on relevant activities through Piestar DPx, and the FSIL ME and USAID will review	▪												USA	Haley Oliver (Purdue), Randy Worobo (Cornell), Julie Hancock (Purdue), Molly Webb (Purdue) Ahmed Kablan (USAID), Meera Chandra (USAID)
1.1.5 Host FSIL gender community of practice meetings and facilitate the exchange of gender-specific knowledge and lessons learned among projects			▪			▪			▪		▪		USA	Hui-Hui Wang (Purdue), Haley Oliver (Purdue), Julie Hancock (Purdue)
1.1.6 Host virtual or in-person meeting of FSIL project leaders, technical experts, advisory committee, and USAID to promote collaboration and learning across the FSIL research portfolio								▪					USA	Haley Oliver (Purdue), Randy Worobo (Cornell), Molly Webb (Purdue), Julie Hancock (Purdue), Amanda Garris (Cornell)
1.1.7 Provide guidance and support to projects related to the translation of research results into impact in public and private sectors as a component of the FSIL semi-annual meetings								▪					USA	Haley Oliver (Purdue), Randy Worobo (Cornell), Molly Webb (Purdue), Julie Hancock (Purdue), Amanda Garris (Cornell)
Activity 1.2: Develop robust MEL, communication, and open data platforms														
1.2.1 Utilize Piestar DPx to monitor activities and collect MEL data from active FSIL subawards						▪						▪	USA	Julie Hancock (Purdue), Molly Webb (Purdue)
1.2.2 Subawards report progress against the FSIL nutrition impact map as part of their MEL reporting												▪	USA	Haley Oliver (Purdue), Randy Worobo (Cornell), Julie Hancock (Purdue), Molly Webb (Purdue), FSIL Collaborators
1.2.3 Provide support to all projects as it relates to data collection, storage, and sharing; make datasets available via the FSIL Dataverse and USAID's Data Development Library as they are finalized	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	USA	Ag Data Services team (Purdue)
1.2.4 Publish e-newsletters that showcase FSIL activities and updates			▪			▪			▪			▪	USA	Amanda Garris (Cornell), Molly Webb (Purdue)
1.2.5 Maintain engagement on Twitter, LinkedIn, and Agrilinks with publication goal of 10-12 blogs or feature stories during the year that emphasize in-country impact and local leadership where possible	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	USA	Amanda Garris (Cornell), Molly Webb (Purdue)
1.2.6 Host 1-2 webinars on food safety issues based on input from surveys, USAID, advisory committee, and/or researchers							▪			▪			USA	Amanda Garris (Cornell), Haley Oliver (Purdue), Randy Worobo (Cornell), Molly Webb (Purdue)
Activity 1.3: Engage FSIL Advisory Committee (1) and Technical Experts (2) in providing guidance and support to ongoing activities														
1.3.1 Collect input from the Advisory Committee and Technical Experts (virtually or in person) on project progress; utilize feedback to improve support and guidance for projects		▪				▪			▪				USA	Haley Oliver (Purdue), Randy Worobo (Cornell), FSIL Advisory Committee, FSIL Technical Experts
1.3.2 Engage the Advisory Committee and Technical Experts (virtual or in person) in mapping future program priorities									▪				USA	Haley Oliver (Purdue), Randy Worobo (Cornell), FSIL Advisory Committee, FSIL Technical Experts
1.3.3 Engage Technical Experts in identifying and implementing small research projects that complement existing FSIL subawards									▪				USA	Haley Oliver (Purdue), Randy Worobo (Cornell), FSIL Technical Experts
1.3.4 Collaborate with the FSIL community to identify and explore opportunities to expand engagement and support of Minority Serving Institutions in global food safety research	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	USA	Haley Oliver (Purdue), Randy Worobo (Cornell), FSIL Technical Experts

(1) FSIL Advisory Committee: Ahmed Kablan (USAID), Betsy Baysinger (USDA-FAS), Shibani Ghosh (Tufts University), Gina Kennedy (GAIN), Howard Popoola (Kroger & GFSI), Bob Baker (Mars), Greg Grothe (Land O'Lakes/Venture 37)

(2) FSIL Technical Experts: Kathryn Boor (Cornell), Gerald Shively (Purdue), Amanda Deering (Purdue), Paul Ebner (Purdue), Levon Esters (Purdue), Jacob (Jake) Ricker-Gilbert (Purdue), Hui-Hui Wang (Purdue), and Martin Wiedmann (Cornell)

Bangladesh: FY2023 Work Plan for the Feed the Future Innovation Lab for Food Safety

Objectives, Activities and Sub-Activities	Timeline of Activity (October 1, 2022 - September 30, 2023 - FY2023)												Country and Location(s) of Activity	Person or Institution Responsible
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
Objective 1: Enhancing Food Safety in Fish and Chicken Value Chains of Bangladesh (Bangladesh Long-Term Subaward)														
Activity 1.1: Analysis of the Knowledge, Attitude and Practices (KAPs) regarding food safety and risk issues related to fish and selected frozen chicken products in a gender and age segregated representative sample of Bangladeshi consumers and major value chain actors; develop training module on food safety														
1.1.1 Finalize survey data and generate reports that reflect the KAPs towards food safety amongst farmers, intermediaries, wholesalers, processors, retailers, and consumers	■	■	■										USA/Bangladesh	TXST, BAU, DU
1.1.2 Conduct sampling for food hazard levels along the fish and chicken value chains s	■	■	■						■	■	■		Bangladesh	TXST, BAU
1.1.3 Conduct analysis of antibiotic residues, bacterial pathogens and heavy metals for samples collected in Activity 1.1.2	■	■	■										Bangladesh	TXST, BAU
1.1.4 Host focus group discussions with value chain actors, including women consumers and traders from both supermarkets and wet markets, to study the gap between expressed norms and actual practices as well as purchase decisions	■	■	■										Bangladesh	BAU, DU
1.1.5 Initiate development of food safety training modules based on the findings from Activities 1.1.1-1.1.4							■	■	■				Bangladesh	BAU, BAU, DU
Activity 1.2: Estimation of the Bangladeshi consumers' willingness to pay (WTP) for a general reduction in exposure to potentially harmful microorganisms and chemicals, and for safety certification in fish and chicken														
1.2.1 Finish conducting the hedonic analysis, which includes surveying retail outlets (wet markets and stores) to evaluate the range of fish and chicken products available in retail markets as well as cataloguing the characteristics, including safety attributes, of the surveyed product	■	■											USA/Bangladesh	TXST, BAU
1.2.2 Analyze results of the hedonic analysis by estimating a regression model to quantify the impact of safety attributes on price			■	■	■	■							USA/Bangladesh	TXST, BAU
1.2.3 Develop reports and disseminate results of the hedonic analysis (using results of Activities 1.2.1 and 1.2.2)										■	■		USA/Bangladesh	TXST, BAU
1.2.4 Conduct experimental auctions to assess consumers' WTP for safer fish products	■	■	■	■	■								Bangladesh	TXST, BAU
Activity 1.3: Evaluate and disseminate research results from experimental auctions and surveys														
1.3.1 Analyze impact of food safety information on consumers' WTP for safer fish products utilizing data obtained from experimental auctions				■	■	■	■	■					USA/Bangladesh	TXST, BAU
1.3.2 Conduct econometric analysis of surveys, focus group discussions, and experimental auction data				■	■	■	■	■	■	■	■		USA/Bangladesh	TXST, BAU
1.3.3 Develop reports and disseminate results from Activities 1.3.1 and 1.3.2										■	■		USA/Bangladesh	TXST, BAU

Cambodia: FY2023 Work Plan for the Feed the Future Innovation Lab for Food Safety

Objectives, Activities and Sub-Activities	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Country and Location(s) of Activity	Person or Institution Responsible
Objective 1: Reducing Foodborne Pathogen Contamination of Vegetables in Cambodia: Innovative Research, Targeted Interventions, and Impactful, Cambodian-Led Engagement (Cambodia Long-Term subaward)														
Activity 1.1: Identify and characterize key microbial pathogens associated with vegetable-borne foodborne disease(s), characterize pathogen transmission through longitudinal studies, and identify critical control points (CCPs) targeted for interventions														
1.1.1 Conduct Whole Genome Sequencing and comparative analysis	■	■	■										USA	PSU
1.1.2 Based on the comparative analysis, identify critical control points and coordinate findings with all partners to set a shared research agenda	■	■											USA/Cambodia	KSU, PU, PSU, RUA, ITC, NISTI, CCF
Activity 1.2: Identify interventions to reduce microbial contamination at CCPs, assess the willingness-to adopt for identified interventions, and strengthen food safety networks and public-private partnerships to position interventions for adoption and scaling														
1.2.1 Conduct intervention research on identified technologies and strategies (Note: Intervention research will be conducted, assessed, and re-conducted based upon assessments.)	■	■	■	■	■	■	■	■	■	■	■	■	Cambodia	RUA, ITC, NISTI, CCF, KSU, PU
1.2.2 Conduct gender assessments with vegetable value-chain members to identify how the proposed interventions would impact gender domains	■	■	■	■	■	■	■	■	■	■	■	■	Cambodia	KSU, PU, CE SAIN, RUA, ITC
1.2.3 Measure food safety awareness, practices, willingness-to-adopt (established and new interventions) in producers and vendors	■	■	■	■	■	■	■	■	■	■	■	■	Cambodia	PU, KSU, PSU, RUA, ITC, CE SAIN, WV
1.2.4 Hold annual strategy and progress meeting with all partners and aligned collaborators in the government and private sector													Cambodia	PU, KSU, RUA, ITC, CE SAIN, WV
Activity 1.3: Deliver data-driven engagement programs across the vegetable value chain while measuring the impact and efficacy of these programs														
1.3.1 Deliver engagement programs that improve food safety awareness among consumers, in partnership with the Consumer Protection, Competition, and Fraud Repression Directorate General	■	■	■	■	■	■	■	■	■	■	■	■	Cambodia	PU, WV, RUA, ITC, KSU, PSU
1.3.2 Integrate research into existing programs (e.g., World Veg's "Grow Against the Flow" project).	■	■	■	■	■	■	■	■	■	■	■	■	Cambodia	PU, WV, RUA, ITC, KSU, PSU
Activity 1.4: Conduct a gender analysis and implement women and youth engagement activities, including a Women's Leadership Program in rural communities														
1.4.1 Finalize Gender Analysis data and develop report to inform future research	■	■	■	■	■	■							Cambodia	KSU, PU, CE SAIN, RUA, ITC
1.4.2 As part of the Women's Leadership Program, develop community-level food safety showcase development projects	■	■	■	■	■	■	■	■	■	■	■	■	Cambodia	KSU, PU, CE SAIN, RUA, ITC
1.4.3 Develop and implement training programs for young food safety scientists	■	■	■	■	■	■	■	■	■	■	■	■	Cambodia	KSU, PU, PSU, RUA, ITC

Kenya: FY2023 Work Plan for the Feed the Future Innovation Lab for Food Safety

Objectives, Activities and Sub-Activities	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Country and Location(s) of Activity	Person or Institution Responsible
Objective 1: Chakula salama: a risk-based approach to reducing foodborne disease and increasing production of safe foods in Kenya (Kenya Long-Term Subaward)														
Activity 1.1: Characterize Salmonella (SALM) and Campylobacter (CAMPY) contamination in poultry chains managed by women and youth farmers in the peri-urban areas of Kenya														
1.1.1 Conduct microbiological surveys in conjunction with Activity 1.2 evaluation studies pre- and post-intervention	■	■	■										Kenya	KEMRI, UN
1.1.2 Analyze samples and estimate prevalence and levels of Salmonella and Campylobacter in poultry products in Kenya	■	■	■	■	■	■							USA/Kenya	OSU, KEMRI
1.1.3 Conduct molecular characterization (Whole Genome Sequencing) and antimicrobial Susceptibility Testing on at least 100 isolates and related bioinformatic analyses.							■	■	■	■	■	■	USA/Kenya	OSU, KEMRI
Activity 1.2: Develop and evaluate the efficacy of culturally and gender appropriate, practical, and scalable intervention strategies for mitigating risk of SALM and CAMPY in poultry that effectively account for gendered roles in poultry production														
1.2.1 Recruit study participants and provide training on selected interventions	■	■	■	■	■	■	■	■	■				Kenya	UN, KEMRI
1.2.2 Conduct pre- and post-intervention assessments to assess knowledge, attitudes, and practices (KAP) relevant to the interventions	■	■	■	■	■	■	■	■	■				Kenya	UN, KEMRI
1.2.3 Analyze data and publish results associated with Activities 1.2.1 and 1.2.2	■	■	■	■	■	■	■	■	■	■	■	■	USA/Kenya	OSU, KEMRI
Activity 1.3: Estimate the public health impact and evaluate the benefits and costs from selected intervention strategies to inform public and private decision-making														
1.3.1 Estimate the burden of SALM and CAMPY in Kenya attributed to poultry using a top-down approach and country-specific FERG data	■	■	■	■	■	■	■	■	■				USA/Kenya	UF
1.3.2 Estimate the impact of the selected interventions on hazard concentrations before and after interventions, and the expected public health impact of these interventions, modulated by the expected adoption of interventions	■	■	■	■	■	■	■	■	■	■	■	■	USA/Kenya	UF, OSU, KEMRI
1.3.3 Evaluate the cost effectiveness of the selected interventions and develop publication(s)/policy brief using the results							■	■	■	■	■		USA	OSU

Senegal: FY2023 Work Plan for the Feed the Future Innovation Lab for Food Safety

Objectives, Activities and Sub-Activities	Timeline of Activity (October 1, 2022 - September 30, 2023 - FY2023)												Country and Location(s) of Activity	Person or Institution Responsible
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
Objective 1: Food Safety Capacity Building in Senegal: Enhancing Resilience of the Dairy Value Chain by Leveraging Public-Private Partnerships (Senegal Long-Term Subaward)														
Activity 1.1: Conduct food safety-enhancing research complemented with training programs to develop capacity														
1.1.1 Design and conduct research for the dairy value chain, that includes, but is not limited to: chilling and pasteurization at aggregation points to minimize microbial deterioration of milk, evaluating and standardizing pasteurization parameters for adoption by SMEs, and optimizing fermentation parameters for safely fermented dairy products	■	■	■	■	■	■					■		Senegal	ITA, ISRA in collaboration with UGA and TU
1.1.2 Develop short-term capacity building training, accreditation, and certification processes for scientists, graduate students, and entrepreneurs as a complement to Activity 1.2.1	■	■	■	■	■	■	■	■	■	■	■		Senegal	ITA, ISRA in collaboration with UGA and TU
Activity 1.2: Provide the food industry with knowledge on cost-benefit propositions for implementing food safety interventions														
1.2.1 Include and research gender as it relates to improving food safety of the dairy value chain	■	■	■	■	■	■	■	■	■	■	■		USA/Senegal	UGA, ISRA, CLM
1.2.2 Conduct cost-benefit analysis studies for the implementation of food safety interventions for women, men, young people, and entrepreneurs (individuals and SMEs) in the formal and informal sectors	■	■	■	■	■	■	■	■	■	■	■		USA/Senegal	UGA, ITA, ISRA
1.2.3 Engage the food industry to identify opportunities to promote adoption of food safety interventions			■	■	■	■	■	■	■	■	■		USA/Senegal	ITA, ISRA, CLM
Activity 1.3: Coordinate development and implementation of comprehensive food safety regulations aligned with government policies														
1.3.1 Finalize publication summarizing relevant food safety policies/regulations in the dairy value chain, focusing on the areas of 1) production, 2) processing, and 3) youth and women in the dairy value chain	■	■	■										USA/Senegal	UGA, ITA, ISRA, TU
1.3.2 Engage in research-based consensus building among regulatory agencies to bridge gaps in food safety policies/ regulations							■	■	■	■	■		USA/Senegal	UGA, ITA, ISRA

Nepal: FY2022-FY2023 Work Plan for the Feed the Future Innovation Lab for Food Safety

Objectives, Activities and Sub-Activities	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Country and Location(s) of Activity	Person or Institution Responsible
Objective 1: Market-led food safety in Nepal: Harnessing production incentives and consumer awareness (Nepal short-term subaward)																					
<u>Activity 1.1</u>: Assess the indicators of contamination risks and foodborne illness incidences among consumers and fresh produce growers																					
1.1.1 Acquire appropriate field test kit for E. coli detection on water samples, portable incubator (s) and arrange to send / bring to Nepal	░	░																		US- TSU	TSU
1.1.2 Develop a simple easily understandable protocol, based on description of the kit to use in field		░	░																	US- TSU	TSU
1.1.3 Train technician or personnel to collect water sample, incubate samples in portable incubators, and undertake detection test on field		░	░																	AFU, Nepal	AFU
1.1.4 Apply and request AFU's Institutional Biosafety Committee (IBC) for approval of E. coli detection protocol from water sample		░																		Nepal	AFU
1.1.5 Collect 125 water samples from consumer households and 125 water samples from fresh produce growers at the time of consumer and producer in-person surveys, incubate on portable incubator (s) and record the result and				░	░			░	░											Nepal	AFU, Sahavagi
1.1.6 Collect data on nutritional and foodborne illness questions during consumer household survey				░	░															Nepal	AFU
1.1.7 Based on presence and absence detection of E. coli results, compile and tabulate results systematically and communicate with project team								░	░											Nepal	AFU
<u>Activity 1.2</u>: Understand the demand for safer quality fresh produce through assessment of consumer consciousness, consumer willingness to pay, and diet diversity of households																					
1.2.1 Design and prepare consumer survey questionnaire	░	░	░																	US- TSU , US-ASU, in	TSU, ASU, AFU
1.2.2 Apply and get IRB approval / exemption			░																	US, Nepal	TSU, Sahavagi
1.2.3 Design and prepare protocol/ procedure for WTP elicitation strategy and sampling				░																US	TSU
1.2.4 Translate survey questionnaire and WTP elicitation strategy protocol in Nepali language				░																Nepal	Sahavagi
1.2.5 Travel of the project PI for orientation to Nepal partners on experimental procedures on WTP elicitation and facilitate consumer survey initiation in Nepal				░																US, Nepal	TSU
1.2.6 Enumerator training and consumer survey sites finalized				░																Nepal	TSU, Sahavagi
1.2.7 Random sampling and administration of consumer household surveys, including WTP elicitation experiments				░	░															Nepal	Sahavagi
1.2.8 Data entry, cleaning, maintenance in readily readable form (like in excel or stata)					░															Nepal	Sahavagi
1.2.9 Finalize model estimations, interpretation and prepare write-ups (manuscripts, conference papers, reports)										░	░									US, Nepal	TSU and project team as appropriate
<u>Activity 1.3</u>: Investigate the incentives for safer quality production by examining food safety practices among fresh produce growers and impacts on costs, revenues, and well-beings																					
1.3.1 Design and prepare fresh produce grower/ farm business household survey questionnaire			░																	US, Nepal	TSU, AFU
1.3.2 Apply and get institutional IRB approval/ exemption from TSU and AFU			░																	US, Nepal	TSU, AFU
1.3.3 Translation of grower/ farm business household survey questionnaire in Nepali language					░															Nepal	AFU
1.3.4 Preliminary site visits and finalize clusters within the location districts for randomized sampling of fresh produce grower/ farm business household				░	░															Nepal	AFU
1.3.5 Administration of the fresh produce grower/ farm business household survey on project location districts (10 districts of 7 provinces in Nepal)					░	░	░													Nepal	AFU
1.3.6 Data entry, cleaning, and compilation						░	░													Nepal	AFU
1.3.7 Documentation of food safety practices adopted by farmers and analyze the factors influencing the adoption decision								░	░	░										US, Nepal	TSU, ASU, AFU
1.3.8 Design and estimate adoption and impact models to investigate the incentives and challenges for food safety																				US	TSU, ASU
1.3.9 Finalize model estimations, interpretation and prepare write-ups (manuscripts, conference papers, reports)																	░	░		US	TSU, ASU
<u>Activity 1.4</u>: Analyze the production and consumption differences by gender and location																					
1.4.1 Design mean-comparatives and statistical test methods to compare by gender and location; derive inferences and prepare write-ups.							░	░												Nepal	AFU
1.4.2 Test the significance of gender on production and consumption related regression models																	░	░		US	TSU, ASU
<u>Activity 1.5</u>: Outreach and awareness trainings on food safety and health hazard reduction to small and medium sized producers emphasizing young and female entrepreneurs.																					
1.5.1 Preparation of food safety training manual/ materials to guide outreach training																	░			US, Nepal	TSU, AFU
1.5.2: Food-safety and health hazard reduction trainings for producers in selected areas, emphasizing female and young farmers																			░	Nepal	TSU, AFU

Nigeria: FY2022-FY2023 Work Plan for the Feed the Future Innovation Lab for Food Safety

Objectives, Activities and Sub-Activities	Timeline of Activity (May 1, 2022 - September 30, 2023 - FY2022/FY2023)																	Country and Location(s) of Activity	Person or Institution Responsible
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
Objective 1: Strengthening household and community food safety in Nigeria (Nigeria short-term subaward)																			
Activity 1.1: Evaluate household vulnerability to foodborne illnesses by monitoring food safety practices and identifying the most prevalent foodborne pathogens using a mixed methods approach.																			
1.1.1 Prepare for and conduct a household survey to assess the following: • Obtain household demographic information • Assess the awareness, knowledge, and self-reported behaviors related to food safety • Determine the number of child experiences with common symptoms of foodborne illness • Evaluate the household water (e.g. sources of drinking water and water for domestic needs), sanitation (e.g. household excreta disposal facilities for adults, child defecation practices, solid waste disposal practices) and hygiene	▓	▓	▓	▓	▓	▓												USA/Nigeria	UAF, USU, Bowen
1.1.2 Collect anthropometric measures from children 5 years and younger in the household to assess nutrition status			▓	▓	▓													USA/Nigeria	UAF, USU, Bowen
1.1.3 Conduct an environmental sanitation assessment to investigate conditions in the household environment including food preparation locations (e.g., kitchens) that can compromise food safety using Adenosine Triphosphate (ATP) monitoring aerobic plate counts and E. coli/ coliform plate counts					▓	▓		▓										Nigeria	Bowen
1.1.4 Visually document mothers' lived experience interacting with factors in the physical environment that impact food safety								▓		▓								USA/Nigeria	UAF, USU, Bowen
Activity 1.2: Understand the extent to which strategies described in The Nigerian National Policy on Food Safety, published in 2014, are recognized and implemented by key stakeholders (i.e. primary health care providers, community development personnel in Local Government Areas (LGAs), representatives from the State Ministry and civil societies, and community-based organizations).																			
1.2.1 Organize 2 virtual structured panel discussions									▓	▓								USA/Nigeria	UAF, USU, Bowen
1.2.2 Conduct 24 in-depth interviews									▓	▓	▓							USA/Nigeria	UAF, USU, Bowen
Activity 1.3: Identify priority areas for food safety intervention programing, using a novel data-driven approach based on GIS mapping.																			
1.3.1 Develop a map of community-level foodborne illness vulnerability														▓	▓	▓	▓	USA/Nigeria	USU, Bowen

Acronym	Full Name
BAU	Bangladesh Agricultural University
CCF	Consumer Protection, Competition, and Fraud Repression Directorate General
CESAIN	Center of Excellence on Sustainable Agricultural Intensification and Nutrition
CLM	Cellule De Lutte Contre La Malnutrition
DU	University of Dhaka
IBC	Institutional Biosafety Committee
ILRI	International Livestock Research Institute
IPC	Institut Pasteur du Cambodge
IRB	Institutional Review Board
ISRA	Institut Sénégalais de Recherches Agricoles
ITA	Institut de Technologie Alimentaire
ITC	Institute of Technology Cambodia
KAPs	Knowledge, Attitude and Practices
KEMRI	Kenya Medical Research Institute
KSU	Kansas State University
NISTI	National Institute of Science, Technology and Innovation
OSU	The Ohio State University
PSU	Penn State University
PU	Purdue University
RUA	Royal University of Agriculture, Cambodia
TU	Tuskegee University
TXST	Texas State University
UF	University of Florida
UGA	University of Georgia
UN	University of Nairobi
USAID	United States Agency for International Development
World Veg (WV)	World Vegetable Center