



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

## Feed the Future Innovation Lab for Nutrition

**Semi-Annual Report**  
**October 1, 2015- April 30, 2016**



**USAID**  
FROM THE AMERICAN PEOPLE

**Tufts**  
UNIVERSITY

Friedman School  
of Nutrition Science  
and Policy



Lessons learned from programs in Nepal and Uganda which integrate agriculture and nutrition action

Leader with Associates Cooperative Agreement #AID-OAA-L-10-00006

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## Table of Contents

|   |    |
|---|----|
| I. Feed the Future Innovation Lab for Nutrition .....   | 2  |
| II. Research Progress Summary .....   | 2  |
| Objective 1: Understanding Agriculture to Nutrition Pathways .....                              | 2  |
| Objective 2: Study Neglected Biological Mechanisms and Pathways .....                           | 5  |
| Objective 3: Study Household and Community Resilience.....                                      | 7  |
| III. Human and Institutional Capacity Development.....  | 7  |
| Objective 1: Building Capacity in Nutrition and Agriculture.....                                | 7  |
| Objective 2: Institutional Development .....  | 8  |
| IV. Information Dissemination.....  | 8  |
| V. Governance of the Nutrition Innovation Lab .....   | 13 |
| VI. Database Management and Curation of Data.....   | 14 |
| VII. EMMP – Environment Monitoring and Mitigation Plan .....                                    | 14 |
| VIII. Future Work.....  | 14 |
| Appendix I: Feed the Future Innovation Lab for Nutrition Annual Work Plan Fiscal Year 2016..... | 15 |

## **I. Feed the Future Innovation Lab for Nutrition**

The Feed the Future Innovation Lab for Nutrition (hereafter referred to as the Nutrition Innovation Lab) pursues research to understand the following: i) how agriculture can be leveraged to achieve improved nutrition; ii) how multiple sectors of policy and program activity can be integrated to improve maternal and child nutrition; and iii) the role of neglected biological mechanisms (e.g. aflatoxins, environmental enteric dysfunction). The Management Entity (ME) for the Nutrition Innovation Lab is at Tufts University.

## **II. Research Progress Summary**

### **A. Research progress made during the reporting period**

#### **Objective I: Understanding Agriculture to Nutrition Pathways**

##### **Program Activities and Highlights**

###### **a. PoSHAN Community Studies in Nepal**

###### *i) Understanding agriculture to nutrition pathways*

The PoSHAN Community panel survey collects data annually from roughly 4,300 households. A fourth round will begin during June 2016 in all 21 districts study sites.

###### *ii) Collaborators*

Johns Hopkins University (lead), National Agriculture Research Centre (NARC), Tribhuvan University, New Era, and Tufts University

###### *iii) Accomplishments*

A subcontract for a fourth round of data collection was signed with a local survey firm, New Era. Questionnaires were modified to incorporate more detail on food and non-food expenditures, livestock ownership and agricultural inputs. Survey instruments were submitted to the Nepal Health Research Council (NHRC) for approval.

###### *iv) Presentations and Publications*

A paper led by Dr. Shibani Ghosh has been submitted as part of a supplement to be published in 2017 in the Proceedings of the National Academy of Sciences. Another paper led by the Johns Hopkins team is nearly finished. A third, jointly authored by Johns Hopkins and Tufts has been accepted for publication by the Food and Nutrition Bulletin.

###### *v) Capacity Building and Training of Data Collectors*

Enumerator training took place during March and April 2016. The focus was on refreshing returning enumerators and training them on changes made to the survey instruments. A total of 60 data collectors (survey firm staff) were trained. This annual training represents a significant contribution to existing capacity-building goals in Nepal.

###### *vi) Issues and Concerns*

Because the initial Institutional Review Board (IRB) approval was for a period of three years, a new application had to be submitted for the fourth and for subsequent rounds. This review is underway. Reconnaissance of earthquake-affected districts highlighted the challenge of locating households which moved due to the reconstruction process. The

team is considering solutions to this issue.

## **b. PoSHAN Policy Process Research**

### *i) Measuring the quality of nutrition governance.*

In July 2016, a full Round 4 of the policy panel will be implemented (using electronic data capture) in the same 21 districts used for the PoSHAN community-level surveys implemented by the Valley Research Group (VaRG), in collaboration with Tufts University, Helen Keller International (HKI) and the Patan Academy of Health Sciences (PAHS).

### *ii) Collaborators*

Patan Academy of Health Sciences, HKI Nepal, Valley Research Group, and Tufts University

### *iii) Accomplishments*

In January 2016, the truncated version of the PoSHAN Policy survey (Round 3) was completed in five districts out of 21 of Nepal's PoSHAN districts. There was a delay in the completion of Round 3 (which would normally have been completed in Fiscal Year 2015), due to the severe impact of the April 25, 2015 earthquake. Nevertheless, detailed data from five districts offer insight into how nutrition governance is changing over time.

### *iv) Presentations and Publications*

The team has examined data comparing PoSHAN Policy Round 2 to Round 3. Several papers using the Round 2 (2014) and Round 3 (2015) data are planned. A presentation will be made on findings at the Annual Scientific Symposium in Kathmandu in July 2016. This will be turned into one of three papers (from the Nutrition Innovation Lab's work) for a special issue of the Food and Nutrition Bulletin on nutrition governance in Nepal, Uganda and Ethiopia to be co-edited with SPRING (for publication in Fiscal Year 2017).

## **c. The Birth Cohort Study in Uganda**

### *i) Livelihood and nutrition interventions to improve maternal and child nutrition in Uganda*

The study has enrolled 5,044 women in 12 districts since November 2014. Following pregnancy outcomes and child growth in districts targeted by USAID's Community Connector Project (CCP) versus those in non-targeted districts permits an assessment of the potential effects on nutrition of combined CCP activities relating to agriculture, livelihood development, health promotion and market development. The birth cohort study also supports an assessment of the role of dietary aflatoxin exposure, detected in the blood of mothers and infants, in determining nutrition outcomes. At present, the cohort study is winding down since all children have now reached six months of age. Field teams are cleaning data prior to analysis.

### *ii) Collaborators*

Makerere University, Harvard University, University of Georgia, and Tufts University

### *iii) Accomplishments*

As of April 2016, the study completed 72 weeks of data collection, and now wind-down of the

study has been in progress. Field activities will end in June 2016.

iv) *Presentation and Publications*

Data cleaning is ongoing and investigators are actively discussing priority analyses and responsibilities for writing various papers during the summer of 2016.

v) *Issues and Concerns*

During study implementation, the ME came to realize that the cost of in-country transportation of field staff was much higher than anticipated, and therefore overall costs per household visit exceeded the amount originally budgeted. In addition, there were unanticipated expenses, such as a new Uganda labor tax and higher than expected expenses associated with the storage of blood samples at local health centers. As a result, the ME has decided to close down the study when all children have reached six months of age, rather than the original target of 12 months of age. If additional resources could be found, a later follow-up of the same children could be envisaged.

**d. Uganda Panel Survey**

i) *Assessing the linkage between agriculture, food security, nutrition and health among women and children in rural Ugandan households*

A repeated panel survey (baseline, midline, and endline assessment) is being conducted to determine if and how the USAID Uganda Community Connector has improved production practices, incomes and nutrition. The midline assessment showed no change in key program indicators over baseline. While not a traditional impact evaluation design, the design of this study provides a snapshot of Community Connector implementation and the potential for integrated programs to affect change. The endline assessment is planned for the first quarter of Fiscal Year (FY) 2017.

ii) *Collaborators*

Makerere University, Harvard, and IFPRI take the lead, collaborating with Tufts

iii) *Accomplishments*

Preparations for the third and final panel survey relating to the USAID Uganda Community Connector Program have started. In April 2016, a meeting was held in Kampala with the USAID Uganda Community Connector team to share lessons learned.

iv) *Presentations and Publications*

Dr. Nassul Kabunga presented the livestock anemia analysis at an IFPRI-RISE Annual Research day in Washington, DC on March 15, 2016. A paper on that analysis has been submitted to the supplement of the Proceedings of the National Academy of Science.

v) *Issues of Concerns*

The Uganda Mission asked the ME to share panel data with the Community Connector Project (CCP) group before December 2016 since this is when CCP will end. However, to be able to have comparable data each year, the Nutrition Innovation Lab Panel 3 study must start in December 2016; data will only be ready to share in May 2017. We discussed this in detail during the Tufts team visit with the Mission. Dr. Kabunga and the Mission staff agreed to meet with the CCP staff in August 2016 to discuss appropriate timelines

and come to an agreement on what data can be mutually shared with each other.

**e. Bangladesh Aquaculture and Horticulture for Nutrition Study**

*i) Linking Agriculture and Health for dietary diversity, income and nutrition*

The Nutrition Innovation Lab, collaborating with the Horticulture Innovation Lab, the AquaFish Innovation Lab, and other partners in Bangladesh, is studying the population-level effects of exposure to one or more agricultural interventions (specifically horticulture and aquaculture) and post-harvest technologies on diets and nutrition.

*ii) Collaborators*

HKI/Bangladesh, DATA Company, Tufts University, Horticulture Innovation Lab, WorldFish, AquaFish Innovation Lab, Dhaka University, Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING).

*iii) Accomplishments*

Protocol approvals were successfully secured from the Bangladesh Medical Research Council (BMRC) and the Tufts Institutional Review Board (IRB). Early findings for a subsample of households were presented to the Technical Advisory Group (TAG) on March 31. Sub-award with a survey firm has been fully executed.

*iv) Presentations and Publications*

At the January TAG meeting, Dr. Sabi Gurung presented on the progress of the Bangladesh Aquaculture for Horticulture and Nutrition study to TAG members while Drs. Webb and Deltsidis presented early findings at the TAG meeting on March 31.

*v) Capacity Building*

In October 2015, 50 enumerators, supervisors and phlebotomists were trained in collecting data on agriculture, food security, diet diversity and nutritional status (which was measured using anthropometry and hemoglobin levels). We anticipate training on the EMMP to begin within the next couple of months.

*vi) Issues of Concerns*

A major concern has been that the Horticulture Innovation Lab has faced delays in installing its CoolBot technology. The system requires special insulated wall materials and a backup generator in the CoolBot room to maintain cold storage even during power cuts (which are frequent). The ME has helped the Horticulture Innovation Lab team to identify solutions, facilitating importation of a generator which is now in place and securing appropriate materials locally. The floating gardens have also posed problems due to an unexpected pest infestation. This had to be managed by identifying an effective non-chemical approach to pest eradication which did not affect the pond water and fish.

**Objective 2: Study Neglected Biological Mechanisms and Pathways**

**Program Activities and Highlights**

**a. Aflacohort Study, Nepal**

*i) Maternal Exposure to Mycotoxins, Birth Outcomes and Stunting in Infants*

This study considers the impact of mycotoxin exposure (maternal and infant) on birth outcomes and length-for-age in Nepal. As of March 2015, the study had enrolled 940 participants (of the planned 1,670). The first blood samples were shipped to the University of Georgia. First results on aflatoxin levels will be presented at the Scientific Symposium in Nepal.

*ii) Accomplishments*

As of March 31, 2016, the study had recruited 1,000 women. The first shipment of blood and samples reached the University of Georgia and is being analyzed for aflatoxin levels.

*iii) Capacity Building*

Forty-seven team staff, enumerators, supervisors, nurses and field guides (16 men and 31 women) have been retrained to ensure consistency of implementation and data collection.

*iv) Issues and Concerns*

There has been turnover of staff during the study. The Field Service Officer departed and the Research Manager resigned. HKI and Tufts are working together to ensure a quick hiring of new staff along with supporting the field teams on the ground.

**b. Aflatoxin Levels in Women and Infants: Birth Cohort Study, Uganda**

As part of the Uganda Birth Cohort Study, further analyses will be conducted on a subsample of pregnant women and their infants to determine the levels of aflatoxin. Approximately 12,000 frozen sera samples have been shipped from Kampala to Tufts.

**c. Assessment of Environmental Enteropathy in Uganda**

*i) Nutritional Consequences of Environmental Enteric Dysfunction (EED) in Uganda*

This study explores possible risks of exposure to enteropathogens and enterotoxins in undernutrition. The goal is to understand the environmental contributors of EED.

*ii) Accomplishments*

Fourteen enumerators were trained to conduct lactulose mannitol tests used to determine changes in gut permeability (and hence likely gut disorders).

**d. East Africa Associate Award: Gulu Cohort, Uganda**

*i) Effects of exposure to mycotoxins on the growth of HIV-exposed and unexposed infants*

This study involves secondary analysis of blood samples from a now-concluded study in Gulu.

*ii) Accomplishments*

The laboratory analyses were completed at the University of Georgia. Barnabas Natamba, the PI in Uganda, started analysis on aflatoxin levels in relation to infant birth weights and growth.

**e. East Africa Associate Award: DELFIA**

*i) Use of the DELFIA kit for estimating aflatoxin levels in biological samples*

This project seeks to develop a sensitive, low-cost evaluation system for aflatoxin detection in blood. The aim is to develop a system using small volumes of blood—obtained by a finger prick, not by venipuncture—enhancing acceptability. The cost per test would also be much less than the current cost of approximately \$100-\$300 per test using current methods (the DELFIA GTP-binding kit).



ii) *Accomplishments*

This activity is ongoing, having successfully identified low-cost methods which achieve more than 60% accuracy in relation to benchmark tests.

**f. Egypt Associate Award**

i) *Causes and Solutions to Address Stunting in Egypt*

An Associate Award supports the study of factors which affect childhood stunting in Egypt and identification of the linkages between linear growth, overweight and obesity.

ii) *Accomplishments*

The ME submitted the secondary data analyses and protocols for the primary data collection.

iii) *Issues and Concerns*

There have been significant issues related to protocol approval due to security concerns and ensuring that the Ministry of Health would approve the protocols. There has been much interaction with the Mission and local partners to determine the best way to proceed. Ministry of Health approval of the study would allow the Mission to approve a no-cost extension of the award.

### **Objective 3: Study Household and Community Resilience**

#### **Program Activities and Highlights**

**a. Understanding Household Resilience to Shocks**

i) *Understanding the Effects of Environmental Shocks in Nepal: PoSHAN Panel Study*

The focus of this research is on issues of household risk, price volatility, and environmental and other shocks for agricultural development and program implementation.

ii) *Accomplishments*

As noted under Objective 1 (PoSHAN community studies), questionnaires were modified to include inquiries about loss and recovery since the April 2015 earthquake. The ME had several meetings with researchers at Tufts involved in implementing the USAID/Nepal-funded project, Promoting Agriculture, Health, and Alternative Livelihoods (PAHAL). PAHAL similarly seeks to understand how to strengthen livelihoods, improve nutrition, and mitigate, adapt to, and recover from shocks and stresses in rural communities. The goal is to share research designs, collaborate through data-sharing, and engage in joint presentations in Nepal on potentially policy-relevant findings.

### **III. Human and Institutional Capacity Development**

#### **Objective 1: Building Capacity in Nutrition and Agriculture**

**A. Short-Term Training**

i) *Trainings*

A total of 94 individuals were trained across Nepal, Bangladesh and Uganda.

ii) *Bangalore Boston Nutrition Collaborative*

The Nutrition Innovation Lab continued to support the Bangalore Boston Nutrition

Collaborative through a sub-award to St. John's Medical College. Three people were supported (2 women and 1 man) from Nepal and Uganda.

## **B. Long-Term Training**

### *i) Doctoral Training*

The Nutrition Innovation Lab is supporting five students enrolled in doctoral programs in the US. Three are women and two are men, all of whom are focusing on nutrition and food science, food policy and applied nutrition, and agricultural economics. One of the male students is close to completing a Master's degree.

### **a. Malawi**

This project builds pre-service nutrition education and training capacity in Malawi through guiding the development and implementation of a dietetics program.

### *i) Accomplishments*

In February 2016, the Medical Council approved the accreditation of the Dietetics Program and the Program launched in March 2016. The team also helped coordinate the clinical rotations (e.g., KCH hospital in Lilongwe and Queen Elizabeth in Blantyre). Memoranda of Understanding were developed with hospitals.

## **Objective 2: Institutional Development**

### **a. Support to the Institute of Medicine, Tribhuvan University, Nepal**

The Nutrition Innovation Lab continues to support the Institute of Medicine (IOM) at Tribhuvan University and its new nutrition specialization within the MPH program. In October, 2016, Dr. Patrick Webb addressed graduate students and faculty members at the IOM. A total of 27 students and eight faculty members attended the lecture.

### **b. Nepal Advanced Research Methods Course**

The Nutrition Innovation Lab continues working with the Patan Academy of Health Sciences in the development of an intensive advanced research methods training for Nepali public health and agriculture researchers. Other collaborators include the Institute of Medicine, Harvard University, and St. John's Research Institute (Bangalore).

### **c. The 4<sup>th</sup> Nepal Annual Scientific Symposium**

The Nutrition Innovation Lab, with support from the USAID Mission in Nepal, is organizing the 4<sup>th</sup> Annual Scientific Symposium in July 2016. The aim of the Symposium is to enhance local capacity to propose, maintain and present high-quality research. The Symposium is organized by Nutrition Innovation Lab partner Johns Hopkins University in collaboration with NARC, Tufts, IOM and Nepalese Technical Advisory Group (NTAG).

## **IV. Information Dissemination**

Table 1 and 2 provide the list of presentations and publications which have been accomplished in the first half of Fiscal Year 2016.

**Table I: List of Presentations**

| Presenter   | Event   | Place             | Title   | Date          | Size of Audience  |
|---|---|-------------------|---|---------------|---|
| Patrick Webb  | Seminar for graduate students, Institute of Medicine, October 14 2015 | Kathmandu, Nepal  | Nutrition-Specific and Nutrition-Sensitive Interventions: Implications for Programming in Nepal   | December 2015 | 50+ graduate students and 4 faculty                     |
| Elizabeth Mitcham, Sabi Gurung, Angelos Deltsidis , Amrita Mukerjee, Resaul Islam | USAID presentation: TAG meeting                                       | Dhaka, Bangladesh | Aquaculture-Horticulture for Nutrition Project: Update with Technical Advisory Group  | January 2016  | 16  |
| Patrick Webb  | USAID presentation: TAG meeting                                       | Dhaka, Bangladesh | Aquaculture and Horticulture Programs: Impact of single vs. multiple interventions in Bangladesh (Early Preliminary Findings)                             | March 2016    | 20  |
| Angelos Deltsidis   | USAID presentation: TAG meeting                                       | Dhaka, Bangladesh | Updates of Horticulture Innovation Lab technology innovation Research   | March 2016    | 20  |
| Rosemary Green, Jennie Sutherland, Alan Dangour, Bhavani Shankar, Patrick Webb    | Experimental Biology  | Boston, MA, US    | Dietary Quality, Undernutrition and Disease: Global Patterns and Trends over Three Decades  | April 2016    | 500+ in total; 350+ in plenary talk; 150+ in side panel |
| Florence Turyashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade      | District meeting  | Kamwenge, Uganda  | Effectiveness of Integrated Agriculture, Health Livelihood and Nutrition Interventions to Improve Maternal and Child Nutrition and Health in Rural Uganda | October 2015  | 25  |
| Florence Turyashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade      | District meeting  | Kabarole, Uganda  | Effectiveness of Integrated Agriculture, Health Livelihood and Nutrition Interventions to Improve Maternal and Child Nutrition and Health in Rural Uganda | October 2015  | 45  |

|  |                  |                 |   |               |    |
|--|------------------|-----------------|---|---------------|----|
| FlorenceTuryashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade  | District meeting | Lira, Uganda    | Birth cohort study preliminary findings   | October 2015  | 29 |
| FlorenceTuryashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade  | District meeting | Kabale, Uganda  | Effectiveness of Integrated Agriculture, Health Livelihood and Nutrition Interventions to Improve Maternal and Child Nutrition and Health in Rural Uganda | October 2015  | 38 |
| FlorenceTuryashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade  | District meeting | Zombo, Uganda   | Birth cohort study preliminary findings   | October 2015  | 23 |
| Florence Turyashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade | District meeting | Nebbi, Uganda   | Effectiveness of Integrated Agriculture, Health Livelihood and Nutrition Interventions to Improve Maternal and Child Nutrition and Health in Rural Uganda | October 2015  | 23 |
| FlorenceTuryashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade  | District meeting | Lamwo, Uganda   | Birth cohort study preliminary findings   | October 2015  | 20 |
| FlorenceTuryashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade  | District meeting | Kanungu, Uganda | Effectiveness of Integrated Agriculture, Health Livelihood and Nutrition Interventions to Improve Maternal and Child Nutrition in Rural Uganda            | October 2015  | 46 |
| FlorenceTuryashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade  | District meeting | Pader, Uganda   | Birth cohort study preliminary findings   | November 2015 | 33 |
| FlorenceTuryashemererwa, Bernard Bashaasha, Annet Kawuma, Miriam Nakyambade  | District meeting | Apac, Uganda    | Effectiveness of Integrated Agriculture, Health Livelihood and Nutrition Interventions to Improve Maternal and Child Nutrition and Health in Rural Uganda | October 2015  | 52 |

|  |  |                                      |   |              |     |
|--|--|--------------------------------------|---|--------------|-----|
| Elizabeth Asiimwe  | Viva voce  | Makerere University, Kampala, Uganda | Effect of Nutrition-Sensitive Agricultural Extension on Nutrition Knowledge and Dietary Practices of Farming Households in Mukono | April 2016   | 15  |
| Elizabeth Mitcham, Angelos Deltsidis, Amrita Mukherjee, Resaul Islam | 2nd Technical Advisory Group meeting                     | Dhaka, Bangladesh                    | Aquaculture-Horticulture Project Updates  | January 2016 | 16  |
| Angelos Deltsidis, Amrita Mukherjee, R Islam                         | 3rd Technical Advisory Group meeting                     | Dhaka, Bangladesh                    | Aquaculture-Horticulture for Nutrition Project Updates  | March 2016   | 20  |
| Sudeep Shrestha  | International Conference on Maternal and Child Nutrition | Colombo, Sri Lanka                   | Linking Agriculture, Food Security, Diet and Nutrition in Nepal:  | October 2015 | 500 |



**Table 2: List of Publications and Abstracts** (names in bold indicate individuals directly involved in the work of the Nutrition Innovation Lab)

| Title   | Authors  | Country | Date           | Publisher  |
|---|--|---------|----------------|--|
| Daily zinc but not multivitamin supplementation reduces diarrhea and upper respiratory infections in Tanzanian infants: a randomized, double-blind, placebo-controlled clinical trial | <b>Christopher Duggan, Wafaie Fawzi</b> and colleagues   | Global  | September 2015 | J Nutr. 2015;145(9):2153-60  |
| Iron supplementation in iron-replete and nonanemic pregnant women in Tanzania: a randomized clinical trial  | <b>Christopher Duggan, Wafaie Fawzi</b> and colleagues   | Global  | October 2015   | JAMA Pediatr 2015; 169:947-55. PMID: 26280534  |
| Determinants of anemia among human immunodeficiency virus-positive adults at care and treatment clinics in Dar Es Salaam, Tanzania  | <b>Christopher Duggan, Wafaie Fawzi</b> and colleagues   | Global  | December 2015  | Am J Trop Med Hyg 2015 PMID: 26666698  |
| The prevalence of anemia and iron deficiency is more common in breastfed infants than their mothers in Bhaktapur, Nepal   | RK Chandyo, Sigrun Henjum, M Ulak, <b>Andrew Thorne-Lyman</b> , R Ulvik, P Shrestha, L Locks, <b>Wafie Fawzi, Tor Strand</b>   | Nepal   | December 2015  | European Journal of Clinical Nutrition doi: 10.1038/ejcn.2015.199                      |
| Global dietary quality, undernutrition  | Rosemary Green, Jennifer Sutherland, <b>Alan Dangour</b> , Bhavani Shankar, <b>Patrick Webb</b>  | Global  | January 2016   | BMJ Open 2016; 5: e009331. doi:10.1136/bmjopen-2015-009331                             |
| Head growth of undernourished children in rural Nepal: Association with demographics, health, and diet  | <b>Laurie Miller</b> , Neena Joshi, Mahendra Lohani, Rupa Singh, Beatrice Rogers, <b>Jeffrey Griffiths, Shibani Ghosh</b> , Shubh Mahato, Padma Singh, <b>Patrick Webb</b>       | Nepal   | January 2016   | Paediatrics and International Child Health, ISSN: 2046-9047 (Print) 2046-9055 (Online) |
| Environmental enteric dysfunction in children: a review   | <b>Christopher Duggan</b> , and colleagues   | Global  | March 2016     | J Pediatr Gastroenterol Nutr 2016, PMID: 26974416                                      |
| Vitamin Status among Breastfed Infants in Bhaktapur, Nepal  | Manjeswori Ulak, Ram Chandyo, <b>Andrew Thorne-Lyman, Sigrun Henjum</b> , Per Ueland, Oivind Midttun, Prakash Shrestha, <b>Wafaie Fawzi</b> , Lauren Graybill, <b>Tor Strand</b> | Nepal   | March 2016     | Nutrients 2016, 8(3) 149; doi: 10.3390/nu8030149                                       |
| Elevations in serum anti-flagellin and anti-LPS Igs are related to growth faltering in young Tanzanian children   | <b>Christopher Duggan, Wafaie Fawzi</b> and colleagues   | Global  | April 2016     | Am J Clin Nutr 2016. doi: 10.3945/ajcn.116.131409                                      |

|   |   |        |            |   |
|---|---|--------|------------|---|
| Cross-Sectional but not Longitudinal Measures of Food Insecurity are Associated with the Rate of Weight Gain during Pregnancy in Northern Uganda  | <b>Barnabas Natamba</b> , Saurabh Mehta, Francoise Vermeylen, Elizabeth Widen, <b>Shibani Ghosh</b> , <b>Jeffrey Griffiths</b> , Patsy Branon, Sera Young | Uganda | April 2016 | FASEB J April 2016 30:899.10  |
| HIV infection is associated with a lower rate of gestational weight gain and reduced neonatal length  | <b>Barnabas Natamba</b> , Francoise Vermeylen, Sera L Young, <b>Jeffrey K Griffiths</b> , Patsy M Brannon, Saurabh Mehta                                  | Uganda | April 2016 | FASEB J April 2016 30:lb399   |
| HIV-Infected Pregnant and Lactating Women have Higher Serum Aflatoxin levels than HIV-Uninfected Women  | <b>Barnabas Natamba</b> , <b>Jia-Sheng Wang</b> , Sera L Young, <b>Shibani Ghosh</b> , <b>Jeffrey K Griffiths</b>   | Uganda | April 2016 | FASEB J April 2016 30:668.5   |
| Progression of antepartum depression differs by level of perceived social support and food insecurity   | <b>Barnabas Natamba</b> , Saurabh Mehta, Francoise Vermeylen, Rebecca Joyce Stoltzfus, Sera L Young, <b>Jeffrey K Griffiths</b>                           | Uganda | April 2016 | FASEB J April 2016 30:lb398   |
| Perinatal Exposure to Aflatoxins is Associated with a Lower Rate of Weight Gain Among HIV-Infected Women and Linear Growth of HIV-Exposed Infants | <b>Barnabas Natamba</b> , <b>Jia-Sheng Wang</b> , Sera Young, <b>Shibani Ghosh</b> , <b>Jeffrey Griffiths</b>   | Uganda | April 2016 | FASEB J April 2016 30:432.6   |
| Sustaining healthy diets: The role of capture fisheries and aquaculture for improving nutrition in the post-2015 era                              | <b>Shakuntala Thilsted</b> , <b>Andrew Thorne-Lyman</b> , <b>Patrick Webb</b> , Jessica Rose Bogard, Michael John Phillips, Edward Hugh Allison           | Global | May 2016   | Food Policy vol. 61, May 2016, pg 126-131<br>doi:10.1016/j.foodpol.2016.02.005  |
| Child dietary quality in rural Nepal: Effectiveness of a community-level development intervention   | Amelia F. Darrouzet-Nardi, <b>Laurie C. Miller</b> , <b>Neena Joshi</b> , Shubh Mahato, Mahendra Lohani, Beatrice L. Rogers                               | Nepal  | May 2016   | Food Policy vol. 61, May 2016, pg 185-197.<br>doi:10.1016/j.foodpol.2016.03.007 |

## V. Governance of the Nutrition Innovation Lab

Nutrition Innovation Lab ME tasks were implemented smoothly during first half of Fiscal Year 2016. Research and training funds were disbursed among the many partners in a timely manner. As planned and budgeted for in the Fiscal Year 2016 Work Plan, the ME was able to restructure the organizational structure in Asia and Africa. In October, the Nutrition Innovation Lab ME hosted a special event in Kathmandu attended by local partners from PAHS, HKI, Kathmandu Medical College, the Nepal Institute of Medicine (IOM), Valley Research Group (VaRG), and the Nepal Health Research Council (NHRC).

## **VI. Database Management and Curation of Data**

In October 2015, the Nutrition Innovation Lab ME developed its data management plan (DMP) which was approved by USAID. The Nutrition Innovation Lab will generate a series of diverse data sets which range from longitudinal household panel data, including: agriculture, food security, household consumption and expenditure, water, hygiene, sanitation, water quality, longitudinal individual data on nutrition, diet, health, biomarkers (i.e., serum aflatoxins, micronutrients, gut microbiome, environmental enteropathy), and anthropometry, as well as longitudinal policy level data on nutrition and governance. Institutions which are responsible and/or involved in this effort include the ME itself (Tufts University), Johns Hopkins Bloomberg School of Public Health, Harvard T Chan School of Public Health, Makerere University and Purdue University.

## **VII. EMMP – Environment Monitoring and Mitigation Plan**

As per USAID regulations, an Institutional Environmental Evaluation (IEE) was submitted and approved. Based on the approved IEE conditions, an Environmental Monitoring and Mitigation Plan (EMMP) was developed by the Nutrition Innovation Lab ME. An EMMP format was prepared and shared by the Tufts ME with its partners. The EMMP was formed after reviewing the governing IEE/EA and conditions which apply to the project were then translated into specific mitigation actions. Monitoring measures, timelines and responsible parties were specified. Institutions responsible include UC Davis's Horticulture Innovation Lab (Bangladesh), Patan Academy of Health Sciences (Nepal), Makerere University (Uganda) and Kohalpur Medical and Teaching Hospital (Nepal). An update on the EMMP is currently being worked upon by partners and institutions to specify monitoring measures. It will ascertain that mitigation measures developed in the initial plan have been implemented and that they were sufficient and effective.

## **VIII. Future Work**

During the second half of Fiscal Year 2016, the USAID-supported AAMA (Action Against Malnutrition through Agriculture) revisit study will be developed and conducted in three districts (Bajura, Baitadi and Kailali) in Nepal. The Nutrition Innovation Lab has finalized the protocol for a formative survey and is in the process of obtaining approval from the ethical review boards at Tufts and in Nepal. A second phase of data collection on aquaculture, horticulture and nutrition will begin for the Bangladesh Aquaculture for Horticulture and Nutrition study in Bangladesh in July 2016. In addition, a formative survey on the subsample of the Bangladesh Aquaculture for Horticulture and Nutrition study participants in the USAID AIN districts will also be conducted in July 2016.

The Nutrition Innovation Lab ME has developed concept notes for the USAID Missions in Mozambique, Guatemala and Malawi pertaining to possible future research activities. Currently, discussions are underway on the proposed activities in Mozambique and Malawi. While the Mission in Guatemala does not have the resources to support the proposed activities at this time, the Mission has suggested revisiting this in Fiscal Year 2017. The Nutrition Innovation Lab also continues to explore the possibility of a new research activity in Cambodia.

## Annual Work Plan for the Feed the Future Innovation Lab on Nutrition

**Project Goal: Generate rigorous evidence on how to leverage agriculture for improved nutrition, including scaling up multi-sector interventions and effective policy implementation**

| Objectives, Activities and Sub-Activities   | Timeline of activity (October 1, 2015 to September 30, 2016 - FY2016) |   |   |   |   |   |   |   |   |   |   |   | Location of Activity | Person or Institution Responsible |                  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|----------------------|-----------------------------------|------------------|
|   | O   | N | D | J | F | M | A | M | J | J | A | S |                      |                                   |                  |
| <b>Objective 1: Understand Agriculture to Nutrition Pathways</b>  |   |   |   |   |   |   |   |   |   |   |   |   |                      |                                   |                  |
| Activity 1.1: Conduct the 4th POSHAN Panel survey in Nepal  |   |   |   |   |   |   |   |   |   |   |   |   |                      |                                   |                  |
| 1.1.1 Secure sub-contract with existing data collection firm for implementation of POSHAN community studies, update inventory and procurement |   |   |   |   |   |   |   |   |   |   |   |   |                      | Nepal                             | JHU              |
| 1.1.2 Amend protocol and secure approvals for PoSHAN  |   |   |   |   |   |   |   |   |   |   |   |   |                      | Nepal                             | JHU, New ERA     |
| 1.1.3 Implement the 4th annual PoSHAN Community Studies survey  |   |   |   |   |   |   |   |   |   |   |   |   |                      | Nepal                             | JHU, New ERA     |
| Activity 1.2: Conduct the 4th POSHAN Policy panel survey in Nepal   |   |   |   |   |   |   |   |   |   |   |   |   |                      |                                   |                  |
| 1.2.1 Review questionnaires   |   |   |   |   |   |   |   |   |   |   |   |   |                      | Nepal                             | Tufts, HKI, PAHS |
| 1.2.2 Finalize modifications to protocols including any IRB amendments needed   |   |   |   |   |   |   |   |   |   |   |   |   |                      | Nepal                             | Tufts, HKI, PAHS |
| 1.2.3 Questionnaire programming on tablets  |   |   |   |   |   |   |   |   |   |   |   |   |                      | Nepal                             | Tufts, HKI, PAHS |
| 1.2.4 Implement survey across all 21 POSHAN sites   |   |   |   |   |   |   |   |   |   |   |   |   |                      | Nepal                             | Tufts, HKI, PAHS |

| Activity 1.3: Continue data collection on the longitudinal birth cohort study in Uganda   |  |  |  |  |  |  |  |  |  |  |  |  |  |          |                            |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|----------|----------------------------|
| 1.3.1 Continued household visits to follow up on infants 3 months and older   |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda   | Makerere, Tufts, Harvard   |
| 1.3.2 Data review (electronic)  |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda   | Makerere, Tufts, Harvard   |
| 1.3.3 Data Management   |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda   | Makerere, Tufts, Harvard   |
| 1.3.4 Finalization of Time point 1 and 2 (Pregnant women) data for analysis   |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda   | Makerere, Tufts, Harvard   |
| 1.3.5 Finalization of Time point 3 (Births) data for analysis   |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda   | Makerere, Tufts, Harvard   |
| Activity 1.4: Plan and implement the first panel survey in Cambodia   |  |  |  |  |  |  |  |  |  |  |  |  |  |          |                            |
| 1.4.1 Develop protocol (work with Horticulture Innovation Lab PI)   |  |  |  |  |  |  |  |  |  |  |  |  |  | Cambodia | Tufts, UC Davis            |
| 1.4.2 Secure sub-contract with existing data collection firm, update inventory and procurement  |  |  |  |  |  |  |  |  |  |  |  |  |  | Cambodia | Tufts                      |
| 1.4.3 Secure IRB approvals  |  |  |  |  |  |  |  |  |  |  |  |  |  | Cambodia | Tufts                      |
| 1.4.4 Implement the 1st panel survey  |  |  |  |  |  |  |  |  |  |  |  |  |  | Cambodia | Tufts, Local partner (TBD) |
| Activity 1.5: Analysis of secondary datasets to measure complex links among agriculture, nutrition, economic drivers and conditioning factors |  |  |  |  |  |  |  |  |  |  |  |  |  |          |                            |
| 1.5.1 Data analysis, scientific reporting and dissemination   |  |  |  |  |  |  |  |  |  |  |  |  |  | US       | Purdue                     |



## Objective 2: Study Neglected Biological Mechanisms and Pathways

### Activity 2.1: Analyze blood samples from pregnant women for aflatoxin exposure in Banke district, Nepal

|   |  |  |  |  |  |  |  |  |  |  |  |  |       |                  |                  |
|---|--|--|--|--|--|--|--|--|--|--|--|--|-------|------------------|------------------|
| 2.1.1 Collect blood samples on pregnant Women                                     |  |  |  |  |  |  |  |  |  |  |  |  | Nepal | HKI, PAHS, Tufts |                  |
| 2.1.2 Transport samples to University of Georgia                                  |  |  |  |  |  |  |  |  |  |  |  |  |       | Nepal            | HKI, PAHS        |
| 2.1.3 Analysis of aflatoxin exposure rates  |  |  |  |  |  |  |  |  |  |  |  |  |       | US               | U. Georgia       |
| 2.1.4 Presentation of preliminary findings in the 4th National Symposium in Nepal |  |  |  |  |  |  |  |  |  |  |  |  |       | Nepal            | Tufts, HKI, PAHS |

### Activity 2.2: Analyze blood samples from Ugandan pregnant women for aflatoxin exposure

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                 |                 |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--------|-----------------|-----------------|
| 2.2.1 Transport blood samples from Uganda to University of Georgia     |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda | Makerere, Tufts |                 |
| 2.2.2 Analysis of aflatoxin samples                                    |  |  |  |  |  |  |  |  |  |  |  |  |  | US     | U. Georgia      |                 |
| 2.2.3 Presentation of findings at the 1st National Symposium in Uganda |  |  |  |  |  |  |  |  |  |  |  |  |  |        | Uganda          | Tufts, Makerere |

### Activity 2.3: Assess environmental enteropathy and its relationship to community sanitation and nutrition outcomes (Birth Cohort Study)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                 |                          |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--------|-----------------|--------------------------|
| 2.3.1 Develop protocol for assessment of environmental enteropathy |  |  |  |  |  |  |  |  |  |  |  |  |  | US     | Tufts           |                          |
| 2.3.2 Submit for IRB amendment within the birth cohort study       |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US, Uganda      | Tufts, Makerere, Harvard |
| 2.3.3 Data collection  |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda | Makerere        |                          |
| 2.3.4 Transport of urine samples to US                             |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda | Tufts, Makerere |                          |
| 2.3.5 Analysis of urine samples                                    |  |  |  |  |  |  |  |  |  |  |  |  |  | US     | TBD             |                          |

## Objective 3: Study Aspects of Resilience to Environmental Climate/Seismic Shocks and Price Volatility

### Activity 3.1: Explore risk and resilience in the context of program implementation in focus countries.

|   |  |  |  |  |  |  |  |  |  |  |  |  |  |               |                             |
|---|--|--|--|--|--|--|--|--|--|--|--|--|--|---------------|-----------------------------|
| 3.1.1 Add module/questions on household resilience to the Nepal Panel and Uganda Birth Cohort Study |  |  |  |  |  |  |  |  |  |  |  |  |  | Nepal, Uganda | Tufts, JHU, Harvard, Purdue |
| 3.1.2 Data collection   |  |  |  |  |  |  |  |  |  |  |  |  |  | Nepal, Uganda | JHU, Makerere               |
| 3.1.3 Analysis of the effect of vulnerability and risk on household nutrition and resilience        |  |  |  |  |  |  |  |  |  |  |  |  |  | US            | Tufts                       |

| Objective 4: Building capacity in nutrition and agriculture                                      |  |  |  |  |  |  |  |  |  |  |  |  |            |                             |
|--|--|--|--|--|--|--|--|--|--|--|--|--|------------|-----------------------------|
| Activity 4.1: Award of Competitive Post-Doctoral Fellowships                                     |  |  |  |  |  |  |  |  |  |  |  |  |            |                             |
| 4.1.1 Development of call for proposals  |  |  |  |  |  |  |  |  |  |  |  |  | Boston     | Tufts                       |
| 4.1.2 Review and finalization of call  |  |  |  |  |  |  |  |  |  |  |  |  | Boston     | Tufts                       |
| 4.1.3 Release of call for post-doctoral fellowship applications                                  |  |  |  |  |  |  |  |  |  |  |  |  | Boston     | Tufts                       |
| 4.1.4 Review of applications   |  |  |  |  |  |  |  |  |  |  |  |  | Boston     | Tufts                       |
| 4.1.5 Award of two postdoctoral fellowships  |  |  |  |  |  |  |  |  |  |  |  |  | TBD        | TBD                         |
| Activity 4.2: Support students to the Boston Bangalore Nutrition Collaborative                   |  |  |  |  |  |  |  |  |  |  |  |  |            |                             |
| 4.2.1 Award sub-award to St Johns Medical College  |  |  |  |  |  |  |  |  |  |  |  |  | Boston     | Tufts ME                    |
| 4.2.2 Selection of FTF country candidates for BBNC (Nepal, Uganda, Bangladesh, Cambodia, Malawi) |  |  |  |  |  |  |  |  |  |  |  |  | India      | St Johns, Harvard, Tufts    |
| 4.2.3 Implement course   |  |  |  |  |  |  |  |  |  |  |  |  | India      | St Johns, Harvard, Tufts    |
| Activity 4.3: Plan and Implement the 4th annual Scientific Symposium                             |  |  |  |  |  |  |  |  |  |  |  |  |            |                             |
| 4.3.1 Develop agenda for 4th annual Scientific Symposium   |  |  |  |  |  |  |  |  |  |  |  |  | Nepal, US  | JHU, Tufts, IOM, NARC, NTAG |
| 4.3.2 Advertise symposium and engage stakeholders  |  |  |  |  |  |  |  |  |  |  |  |  | Nepal, US  | JHU, Tufts, NARC, IOM, NTAG |
| 4.3.3 Solicit/select research abstracts  |  |  |  |  |  |  |  |  |  |  |  |  | Nepal      | JHU, NARC, IOM, PAHS        |
| 4.3.4 Plan logistics and event and manage 4th Annual Scientific Symposium                        |  |  |  |  |  |  |  |  |  |  |  |  | Nepal      | JHU, NARC, IOM, NTAG        |
| Activity 4.4: Plan and Implement the 1st Uganda national Agriculture-to-Nutrition Symposium      |  |  |  |  |  |  |  |  |  |  |  |  |            |                             |
| 4.4.1 Develop agenda for 1st annual scientific symposium on agriculture-nutrition pathways       |  |  |  |  |  |  |  |  |  |  |  |  | US, Uganda | Tufts, Makerere, Harvard    |
| 4.4.2 Advertise symposium and engage stakeholders  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda     | Tufts, Makerere, Harvard    |
| 4.4.3 Solicit/select research abstracts  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda     | Tufts, Makerere, Harvard    |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                          |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--------|--------------------------|--|
| 4.4.4 Plan logistics and event and conduct a 1st Ugandan Annual Scientific Symposium   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda | Tufts, Makerere, Harvard |  |
| <b>Activity 4.5: Reorganizing and strengthening technical capabilities across Nutrition Innovation Lab partners (Nepal)</b>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                          |  |
| 4.5.1 Strengthen technical capacity to conduct interdisciplinary research focused on improving nutrition   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | Nepal                    | JHU                                      |
| 4.5.1.1 Develop capacity for longitudinal, mixed effect modeling and econometric analysis  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | Nepal                    | JHU, Tufts                               |
| 4.5.1.2 Conduct quarterly meetings with Innovation Lab graduates in country  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | Nepal                    | JHU                                      |
| 4.5.1.3 Organize and conduct >1 lecture/workshop at a local research institution   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | Nepal                    | JHU, Tufts                               |
| <b>Activity 4.6: Continued PHD support to activities</b>   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                          |  |
| 4.6.1 One PHD student at Tufts   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US                       | Tufts                                    |
| 4.6.2 Two PHD students at Purdue   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US                       | Purdue                                   |
| 4.6.3 1 PHD student support at JHU (for POSHAN)  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US                       | JHU                                      |
| 4.6.4 Student Support (1 PHD) at Tuskegee  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US                       | Tuskegee                                 |
| <b>Objective 5: Information Dissemination</b>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                          |  |
| <b>Activity 5.1: Presentations</b>   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                          |  |
| 5.1.1 Presentations at national and international conferences (partners will make in-country presentations on behalf of the Nutrition Lab in Nepal and Uganda; US presentations will be in the form of webinars or conferences if travel and lodging are paid for separately). |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US, Nepal, Uganda        | Tufts and all partners                   |
| <b>Activity 5.2: Publications</b>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        |                          |  |
| 5.2.1 Proceedings of the National Academy of Science (papers from Nepal, Uganda, Ethiopia)   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US, Uganda               | Tufts, JHU, Purdue, HSPH, IFPRI          |
| 5.2.2 Supplement on the Annual Symposium - Nepal and Uganda  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |        | US, Nepal, Uganda        | Tufts, JHU, Harvard, Makerere, IOM, NARC |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-------------------|--|
| 5.2.3 Other peer reviewed publications- Nepal and Uganda (20)- 6 JHU, 5 Purdue, 9 Tufts                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US, Nepal, Uganda | Tufts, JHU, Purdue, IOM, NARC, Makerere, Harvard |
| <b>Activity 5.3: Media</b>   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |  |
| 5.3.1 Maintenance and regular updates to website   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| 5.3.2 Development of updated brochures   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| 5.3.3 Use of Twitter and other forms of social media to disseminate policy relevant messages             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| <b>Objective 6: Governance of the Nutrition Innovation Lab</b>   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |  |
| <b>Activity 6.1: Effectively manage all aspects of the Nutrition Innovation Lab's activities</b>         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |  |
| 6.1.1 Development and operationalization of new lab organizational structure                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| 6.1.2 Set up of new office spaces in Uganda and Nepal  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Uganda, Nepal     | Tufts, JHU                                       |
| <b>Activity 6.2: Board of Directors</b>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |  |
| 6.2.1 Formulate Board of Directors   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| 6.2.2 Host the first new Board of Directors meeting  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| <b>Activity 6.3: Research Coordination Team (RCT)</b>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |  |
| 6.3.1 Establish new Research Coordination Team   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| 6.3.2 Host a first RCT meeting (dates have to be flexible)   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| 6.3.3 Continued interactions with the RCT through the year (using Webex and/or Skype video conferencing) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts  |
| <b>Objective 7: Database Management and Curation of Data</b>   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |  |
| Activity 7.1: Nepal: Manage and curate PoSHAN Community Studies datasets per USAID specifications        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | JHU, Tufts                                       |
| Activity 7.2: Uganda: Manage and curate Birth Cohort Study datasets per USAID specifications             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US                | Tufts, Harvard, Makerere                         |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |                          |                                      |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----|--------------------------|--------------------------------------|
| Activity 7.3: Uganda: Manage and curate Panel datasets per USAID specifications  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | US | Tufts, Harvard, Makerere |                                      |
| <b>Objective 8: EMMP - Environmental Monitoring and Mitigation Plan</b>  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |                          |                                      |
| Activity 8.1: Develop and implement approved EMMP Plan   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    |                          |                                      |
| 8.1.1: Develop EMMP Plan and submit to AOR for review and approval   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | US                       | Dr. Ghosh (ME)                       |
| 8.1.2: Designate a person to be the safe keeper of the EMMP records  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | Uganda, Nepal, Cambodia  | Dr. Ghosh (ME)                       |
| 8.1.3: Procure and make available personal protective equipment (PPE) to be used by students and other hired workers as necessary and appropriate when conducting research work around the pilot testing of small scale food security technologies |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | Cambodia                 | UC Davis, Tufts                      |
| 8.1.4: Ensure that clear safety standards and practices/protocols are established for proper blood sample collection and handling practices to be followed through the duration of the study   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | Uganda, Nepal            | Patan, HKI, Makerere, Harvard, Tufts |
| 8.1.5: Ensure that clear safety standards and practices for proper blood and urine sample collection for environmental enteropathy assessments are established and followed  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | Uganda                   | Makerere, Harvard, Tufts             |
| 8.1.6: Ensure that clear analytical procedures and lab quality assurance protocols for the safe handling and disposal of waste materials from any analytical procedures in the lab are established and followed                                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | Uganda, Nepal, US        | UGA                                  |
| 8.1.7: Ensure that clear safety standards and practices for proper stool (human and livestock) sample collection, handling and disposal are established and followed   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | Uganda                   | Makerere, Harvard, Tufts             |
| 8.1.8: Establish and monitor that research and lab protocols for appropriate handling of waste material generated from any study using fecal DNA are adhered to.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |    | US                       | TBD                                  |



|  |  |  |  |  |  |  |  |  |  |  |  |  |        |                          |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--------|--------------------------|
| 8.1.9: Ensure that clear safety standards and practices are established for proper handling and disposal of contaminated water supplies                            |  |  |  |  |  |  |  |  |  |  |  |  | Uganda | Makerere, Harvard, Tufts |
| 8.1.10: Ensure that clear safety standards and practices are established for the handling of blood samples and disposal of rapid diagnostic kits to detect malaria |  |  |  |  |  |  |  |  |  |  |  |  | Uganda | Makerere, Harvard, Tufts |