



FEED^{THE}**FUTURE**

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



Innovation Lab for Nutrition- Africa
Purdue University Annual Report
October 1st, 2014- September 30th, 2015

**Lessons learned from programs
in Uganda that integrate
agriculture and nutrition actions**

**Award
#AID-OAA-L-10-00006**

**Feed the Future Innovation Lab
for Nutrition-Africa**

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Feed the Future Nutrition Innovation Lab-Africa

Purdue University

Annual Report

Year 5 (2014-2015)

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Objective 1 (from Year 5 Implementation Plan): Research

Understand and measure the connections between agricultural capacity and performance, technology adoption, nutrition outcomes, and conditioning factors at levels of aggregation ranging from household to district, region and nation. Develop an empirically-based and data-driven understanding of the overlap between agricultural issues and health/nutrition issues in Uganda, so as to improve the effectiveness of nutrition policy in Uganda and elsewhere, especially in the USAID Feed the Future countries of east Africa.

Substantial progress achieved, as detailed below.

Objective 2 (from Year 5 Implementation Plan): Data Collection and Analysis

Obtain datasets maintained in government offices and not available electronically or by other means. Continue to work with a collaborator at the University of North Carolina to analyze data from a small household panel survey conducted in six villages of western Uganda to study respiratory illness and supplement this analysis with studies using nationally-representative DHS data.

Substantial progress achieved, as detailed below.

Objective 3 (as stated in Year 5 Implementation Plan): Capacity Building

Increase the capacity and effectiveness of research institutions in Uganda, especially in the College of Agriculture at Makerere University. Train students at the graduate level to become contributing members of the global community fighting against hunger and malnutrition.

Activities ongoing, as detailed below.

Introduction/Overview of Work Plan Rationale/Objectives:

Uganda faces a number of development challenges, including chronic and widespread child malnutrition. Current knowledge and national capacity to address these challenges is insufficient. This research focuses on primary research and data collection to fill knowledge gaps on key issues related to agriculture, health and nutrition, and to simultaneously engage in training to improve knowledge and capacity in Uganda.

Research and capacity building are being undertaken in a manner that aims to be synergistic with USAID Community Connector goals and objectives. Activities are closely aligned with the Feed-the-Future orientation of delivering “Purpose-Driven Research” by: (1) directly addressing socio-behavioral, economic and market factors related to technology and practice adoption; (2) targeting efforts in areas where the poor and malnourished are concentrated; and (3) transforming production systems to ensure enhanced food safety and nutrition. Activities outlined below build upon prior efforts and have been designed through discussions with fellow researchers and NIL partners. We seek to leverage investments in data collection, student training and data analysis to inform agriculture and nutrition policy in Uganda and elsewhere. Several allied research activities, including work on vulnerability and safety-net programs in Ethiopia, have been facilitated by project support for Shively. Outputs are listed below.

Section I: Research Activities

Focal area: *Policy-relevant, hypothesis-driven research on agriculture and nutrition*

Activity 1: In previous years, we secured access to a number of datasets, including multiple rounds of the Uganda National Household Survey (UNHS), Uganda Demographic and Health Survey (DHS) data, and remotely-sensed satellite data (maximum value Advanced Very High Resolution Radiometer (AVHRR) Normalized Difference Vegetation Index (NDVI) composites from the NASA Global Inventory Monitoring and Modeling Systems (GIMMS) group at NASA’s Biospheric Sciences Branch). We supplemented these data with agricultural commodity price data from Uganda with both spatial and temporal resolution. Our efforts focus on analyzing this complex, multi-layered dataset using innovative approaches and to report findings in a series of working papers, journal articles and policy briefs. This research was part of two student MS theses (completed at Purdue University in Years 3 and 4) and constitutes the ongoing focus of one PhD student, George Omiat, at Purdue. Mr. Omiat is on track to complete his program in 2016.

Focal area: *Discrete socioeconomic analysis on key topics*

Activity 2a (Price Analysis): In many settings, nutrition outcomes have been shown to be sensitive to levels and variability of food prices. During Year 4, we completed the compilation, cleaning and analysis of monthly price data for the period 1999 to 2008. These were obtained with the help of project partners at IFPRI and cover 23 markets and 29 commodities. During Year 5, these price data were linked with remotely-sensed data (MODIS) on vegetative health and also combined with rainfall data and DHS child-growth data. Research on the drivers of food prices, the cost of nutritionally adequate diets over time and space, and the connections between food prices and child nutrition are the subject of the first essay in George Omiat’s PhD dissertation.

Activity 2b (Fuel Use and Upper Respiratory Disease): In the early years of the project, we capitalized on an opportunity to leverage USAID BASIS AMA CRSP financial resources to collect survey data in six villages of Western Uganda. The survey was used to extend a household panel (with earlier rounds in 2003 and 2007),

adding new information on cooking technology, meal response to fuel price changes and health impacts, primarily acute respiratory infection (ARI). Leveraging these data to measure health and nutrition interactions in the face of rising fuel prices and associated changes in household cooking behavior provides insights into an under-studied aspect of nutrition in Uganda, in particular as it impinges on home preparation of infant-weaning foods. Activities undertaken directly address food quantity and quality concerns as articulated in the Feed-the-Future program. They also place agricultural production and household decision-making within a larger context that spans biophysical, policy and social elements of household health and nutrition production systems. During Year 5, we continued to analyze these data, including an additional round of data collected in 2012, building on our previously-published findings. In addition, as a synergistic activity, an MS student extended the analysis using a nationally-representative sample of DHS households, thereby expanding the scope of the investigation to measure connections between ARI evidence and child growth outcomes. This student, Onyekachi Aghasili, successfully completed and defended her MS thesis in May 2015.

Lessons learned and challenges in implementing proposed activities

Delays in initial approval and launch of the project created impediments to project start-up, but these have mostly been overcome. However, one consequence is that the PhD student from Uganda who is studying at Purdue will not complete his degree during Year 5 of the project. He is expected to complete his degree in the second half of 2016.

Solutions/resolutions applied or to be applied

We will integrate our activities with the Management Entity (ME) and the mission.

Section II: Capacity-Building Activities

Focal area: Degree training

Activities: Considerable effort was devoted to identifying a student from Uganda for degree training at Purdue. George Omiat was admitted to the PhD program in Agricultural Economics at Purdue University in August 2012 and passed his qualifying examination in the summer of 2014. Mr. Omiat was formerly a junior faculty member at Makerere University, and has been granted leave from that institution to complete his studies in the US. It is expected that upon completion he will be absorbed back into the teaching/research faculty at Makerere. In Year 5, a Nigerian student completed her MS in Agricultural Economics at Purdue. She studied connections between acute respiratory infection and child growth outcomes. She was partially supported by the NIL project.

Lessons learned and challenges in implementing proposed activities

Identifying well-prepared Ugandan candidates for graduate-degree training in the US was a significant early challenge. From a logistical point of view, it would have been desirable to train several MS students under the project, but early project delays and the substantial investment in student recruitment, screening and processing meant that we have been able to train only one student at the PhD level.

Solutions/resolutions applied or to be applied

Mr. Omiat has been processed through TraiNet, and we have made a commitment to maintain continuity of funding to support him through completion of his degree. We have taken steps to use unexpended funds from Year 5, in conjunction with partial university fellowship support, to fund him through the completion of his degree in 2016.

Outputs (not previously or elsewhere reported)

Aghasili, O. 2015. Fuel Choice, Acute Respiratory Infection and Child Growth in Uganda. Unpublished MS thesis. West Lafayette, IN. Purdue University Department of Agricultural Economics.

Ward, P. and G. Shively. "Disaster Risk, Social Vulnerability and Economic Development." Forthcoming in *Disasters*.

Debela, B. L., G. Shively and S. Holden. "Does Ethiopia's Productive Safety Net Program improve child nutrition?" Forthcoming in *Food Security*.

Brown, M., K. Grace, G. Shively, K. Johnson and M. Carroll. 2014. "Using Satellite Remote Sensing and Household Survey Data to Assess Human Health and Nutrition Response to Environmental Change." *Population and Environment* **36**(1): 48-72.

Leveraging and Cost Sharing

We continue to find ways to leverage non-project resources and cost-share contributions to the project. These include one MS student who was cost shared by Purdue University and a second MS student who is partially funded by Purdue. We continue to work closely with Pamela Jagger at the University of North Carolina, who has separate funding to support her research in Uganda. We estimate that the NIL has leveraged approximately \$50,000 of non-NIL support in Year 5. This does not include the substantial leveraging that came as part of our collaboration with Dr. Molly Brown (formerly at NASA) to use remotely-sensed data. That collaboration represents leveraging of several hundred millions of dollars of past US investment in data collection at NASA.

Vignettes

The following figure displays the historical cost of obtaining a nutritionally-adequate diet in Uganda. The data in the graph are constructed by iteratively solving a series of 780 distinct linear programming “cost-minimization” problems, one for each month for each of five regional markets, using a basket of 10 major foods and a set of 14 nutrient requirements. The figure includes a poverty line and shows that for a substantial portion of time during the period 1999-2012, the lowest daily cost at which one could obtain a nutritionally-adequate diet in Uganda exceeded the World Bank poverty line by 25-100%.

