

Annual Report
Purdue University
Year 4 (2013-2014)
Feed the Future Nutrition Innovation Lab-Africa

Principal Investigator:

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Objective 1 (from Year 4 Implementation Plan): Research

Understand and measure the connections between agricultural capacity, technology adoption, nutrition outcomes, and conditioning factors at levels of aggregation ranging from household to district. The key objective is to 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 United States Agency for International Development (USAID) Feed the Future countries of East Africa.

Substantial progress achieved, as detailed below.

Objective 2 (from Year 3 Work Plan): Data Collection and Analysis

(a) Analyze agricultural price data obtained with the help of project partners at the International Food Policy Research Institute (IFPRI) and link these to nutrition outcomes; and (b) 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 (which extends a panel with earlier rounds in 2003 and 2007) to understand patterns of cooking technology, meal response to fuel price changes and health impacts, primarily acute respiratory infection (ARI).

Substantial progress achieved, as detailed below.

Objective 3 (as stated in Year 3 Work 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 Work Plan focuses on studying available observational evidence regarding food security, malnutrition and related topics in Uganda and to undertake 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. The activities outlined below build upon prior efforts and have been designed based on ongoing discussions with fellow researchers and NIL partners. The aim is to leverage investments in data collection, student training and data analysis to generate knowledge that is useful to inform agriculture and nutrition policy in Uganda and elsewhere.

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 ongoing efforts aim to analyze this complex, multi-layered dataset and report findings in a series of working papers, journal articles and policy briefs. This research was part of a student MS thesis completed at Purdue University in Year 3 and constitutes the ongoing focus of one PhD student and one additional MS student at Purdue. The MS student will finish in May 2015. The PhD student is on track to complete his program in May 2016.

Focal area: Discrete socio-economic 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 the year, we made substantial process in

compiling, cleaning and analyzing 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 in Uganda. The PhD student conducting this research completed a review of the literature on agricultural price analysis and has designed protocols for price data analysis and linkages with remotely-sensed data and DHS child-growth data. We have determined that it is feasible to link these price data to both DHS and remotely-sensed data, and will be combining additional secondary data to support analysis of the constructed dataset.

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 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 understudied 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 4, we continued to analyze these data, including an additional round of data collected in 2012, and published findings in the peer-reviewed press. In addition, as a synergistic activity, an MS student is currently extending the analysis to a nationally-representative sample of households and expanding the scope of the investigation to measure connections between ARI evidence and child growth outcomes.

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 May 2016, during Year 6 of the program (if the program continues).

Solutions/resolutions applied or to be applied

We remain committed to integrating all of 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. One student secured admission to the PhD program in Agricultural Economics at Purdue University. George Omiat began his PhD training in August 2012 and is currently a student in good standing, having 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 the past year, we added a new student to the project, Onyekachi Aghasili, a Nigerian woman who is completing her MS in Agricultural Economics at Purdue. She is studying connections between acute respiratory infection and child growth outcomes. She is partially supported by the NIL project and partially supported as a teaching assistant for a course on World Food Problems.

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 funding the student as part of the NIL project. Hence, it is essential that we maintain continuity of funding to support the student through completion of his degree. If the NIL project ends before he completes his degree, we may need to hold budget in reserve and explore options for a no-cost extension beyond 2015.

Outputs (not previously or elsewhere reported)

Brown, Molly, Kathryn Grace, Gerald Shively, Kiersten Johnson and Mark Carroll. 2014. "Using Satellite Remote Sensing and Household Survey Data to Assess Human Health and Nutrition Response to Environmental Change." Forthcoming in *Population and Environment*.

Jagger, Pamela and Gerald Shively. 2014. "Land Use Change, Fuel Use and Respiratory Health in Uganda." *Energy Policy* 67: 713-726.

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 is leveraging approximately \$50,000 of non-NIL support in Year 4. This does not include the substantial leveraging that comes as part of our collaboration with Dr. Molly Brown at NASA to use remotely-sensed data. This collaboration represents leveraging of several hundred millions of dollars of past US investment in data collection at NASA.

Vignettes

See Nepal report.

Annual Report
Harvard School of Public Health
Year 4 (2013-2014)
Feed the Future Nutrition Innovation Lab-Africa

Map or List of Countries Where Work

Uganda

List of Program Partners

Makerere University, Uganda

Acronyms

| | |
|----------------|--|
| BBNC | Bangalore Boston Nutrition Collaborative |
| HSPH | Harvard School of Public Health |
| ME | Management Entity |
| NILA Africa | Feed the Future Innovation Lab for Collaborative Research on Nutrition - Africa |
| UCCP | Uganda Community Connector Project |
| UNCST | Uganda National Council for Science and Technology |

I) Executive Summary

In Year 4, Harvard School of Public Health (HSPH) grew its collaboration with Makerere University and broadened its research agenda in Uganda. HSPH research activities in Uganda are closely linked to the evaluation of USAID's Uganda Community Connector Project (UCCP). During the project year, data management activities were completed on the baseline of a panel study in northern and southwestern Uganda to evaluate the impact of UCCP on household livelihoods and maternal and child nutritional outcomes, and detailed plans were laid for a birth cohort study to examine the mechanisms by which UCCP impacts these outcomes. Capacity-building efforts were integrated into research activities, with additional training opportunities for Ugandan students and researchers provided through the Bangalore Boston Nutrition Collaborative (BBNC) and for a junior Makerere University faculty member at HSPH.

II) Program Activities and Highlights

HSPH, in collaboration with Makerere University and Tufts University, continued implementation of the NILA Uganda Panel Study in rural districts of northern and southwestern Uganda, with finalization of study baseline data and planning for the next round of data collection. Detailed preparations and trainings were also conducted for the upcoming implementation of the NILA Uganda Birth Cohort Study. Training and capacity building for Ugandan scientists were integrated into research activities in Uganda as well as provided through short courses internationally.

III) Key Accomplishments

Management of the Uganda Panel Study baseline data was completed during Year 4, and plans were made for the next round of data collection in the first quarter of Year 5. A draft analysis using baseline panel data to evaluate the relationship between linear growth faltering (stunting) in young children and the adoption and use of agricultural technologies and practices is being revised before submission to a peer-reviewed scientific journal. Detailed planning and training of staff were undertaken for the Uganda Birth Cohort Study, which is also scheduled to begin implementation in the first quarter of Year 5. Specific accomplishments for the Cohort Study included development of the protocol; obtaining of institutional approvals; site selection, visits, and district inception meetings; development, testing, and revision of data-collection tools and an electronic data collection application; and training of supervisors and field staff. Short-term training for Ugandan students, researchers, and junior faculty were conducted in Bangalore, India, and Boston, US.

IV) Research Program Overview and Structure

HSPH research studies in Uganda are linked to the evaluation of the UCCP. All research is conducted in close collaboration with Makerere University and the Management Entity (ME). Effort is made to include training and active involvement of junior staff in

research activities to build capacity in research on agriculture, nutrition, and health linkages.

The 2014 hire of a Uganda-based Research Specialist, responsible for supervising all research activities conducted in collaboration among HSPH, Makerere, and Tufts, has been key for research implementation. The position was advertised, shortlisted candidates were interviewed by multiple members of the research team, and Ms. Annet Kawuma (MPH) was competitively hired. A subcontract was established between HSPH and Makerere University to fund the position, and HSPH provides supervision for the Research Specialist together with the Principal Investigator at Makerere University.

V) Research Project Reports

a) Research linked to evaluation of the UCCP

i) Uganda Panel Study

NILA's Uganda Panel Study, conducted as a collaborative effort among HSPH, Makerere University, and the ME, aims to evaluate the impact of UCCP on household livelihoods and maternal/child nutritional status. The panel study collects representative data from households in randomly-selected districts initiating UCCP activities at varying stages of UCCP's scaling-up plan, thereby creating a natural experiment for evaluating UCCP. Achievements during the project year included extensive data cleaning and documentation of baseline data in partnership with the data manager at Makerere University, creation of key analysis variables, and planning for the next round of panel data collection (to be conducted in early Year 5), including the review of the study plan given changes in UCCP's implementation since the original study design. A draft analysis using baseline panel data of linkages between linear growth and stunting in young children and the adoption and use of agricultural technologies and practices was presented to the study team in June 2014 and is being revised based on received feedback for submission to a scientific journal. Input was also provided on other analyses being conducted by the Makerere team. Up-to-date institutional approvals for research activities have been maintained over the project year.

ii) Uganda Birth Cohort Study

NILA's Uganda Birth Cohort Study, also a collaborative effort among HSPH, Makerere University, and the ME, will examine the effect of interventions that integrate nutrition, health, agriculture, and livelihoods on maternal and child nutritional outcomes. Compared with the panel study, the cohort study will use a wider range of nutritional outcomes including biochemical measures and specifically study exposure to UCCP, uptake of its interventions, and mechanisms by which these impact maternal and child nutritional status.

There was extensive planning for this study in Year 4. The study protocol was developed and received approval from the institutional review boards at HSPH,

Makerere University, and the Uganda National Council for Science and Technology (UNCST). Site selection was conducted per the study protocol, and all 16 selected sub-counties were visited multiple times by personnel from HSPH, Makerere University, and the ME for district inception meetings, outreach to local leaders and communities, assessment of study implementation needs, and interactions with local UCCP staff. Data collection tools were developed, tested, revised, and translated into the four predominant local languages of the study areas. An application for electronic data entry was also developed, tested, and revised as needed. Study supervisor and enumerator positions were advertised, shortlisted candidates were interviewed, and selected candidates were invited for training. Training materials were developed and training was conducted by members of the research team from all three institutions. All trained candidates underwent multiple written examinations, which formed an objective basis for hiring decisions. HSPH provided input and guidance on developing a study implementation plan and associated materials, drafting a study budget, and procurement. A final training for study enumerators is scheduled for September 2014, with recruitment of participants to begin at the beginning of Year 5.

VI) Associate Award Research Project Reports

HSPH was not involved in Associate Awards in Africa.

VII) Human and Institutional Capacity Development

a) Training by Country

i) Short-Term

Christopher Duggan continued his role as Program Director and faculty member for the BBNC short course on nutrition research methods in January 2014. This course was attended by six trainees from Uganda as well as trainees from Nepal who were supported by the Nutrition Innovation Lab, among others. Trainees received two weeks of intensive training on research methods in international nutrition from faculty drawn from Harvard University, St. John's Research Institute, and Tufts University.

In 2014, HSPH targeted its summer training opportunities toward lecturers and junior faculty at Makerere University, with the intention that the selected candidate would utilize his or her training in future curriculum development and research at Makerere, thereby increasing the impact of NILA's capacity-building efforts in Uganda. The selected candidate was also intended to engage in NILA collaborative research after returning to Uganda, having developed research ideas while at HSPH under the mentorship of HSPH faculty and staff.

This training opportunity was widely advertised at Makerere University, and one candidate was competitively selected after the receipt of applications and interviews by multiple NILA personnel. Dr. Agnes Nabubuya, an Assistant

Lecturer in the Department of Livestock and Industrial Resources at Makerere University, attended the Summer Session for Public Health Studies at HSPH in July-August 2014. She took four intensive courses in nutrition and public health and developed a plan for an analysis and scientific paper using baseline data from the Panel Study in consultation with HSPH NILA faculty.

ii) Long -Term

HSPH did not have long-term trainees during the project year.

b) Institutional Development

i) Description

The Research Specialist, hired by Makerere University in partnership with HSPH, received training in her role from researchers at both institutions. Cohort Study supervisors and field staff received extensive training in June and September 2014, respectively, on the study's background, rationale, objectives, and methodology, as well as on ethical conduct of research, details of study implementation, domains of data collection (agriculture, income, nutrition, health, sanitation, gender, etc.), anthropometric assessment of adults and children, and data collection using electronic tablets. Inception meetings for the Cohort Study, held in each of the 12 participating districts, also informed district leaders and key personnel on the background, rationale, objectives, and methodology of the Cohort Study and more broadly on the need for more research on nutrition, health, and agricultural linkages.

ii) Partners

Partners in training and dissemination activities include Makerere University and Tufts University (ME).

VIII) Technology Transfer and Scaling Partnerships

NILA is not involved in technology development, transfer, or scaling.

IX) Governance and Management Entity Activity

Wafaie Fawzi continued his role on the Board of Directors, and Christopher Duggan continued his role on the Technical Advisory Committee during the project year.

X) Other Topics

None to report.

XI) Issues

None to report.

XII) Future Directions

In the first quarter of Year 5, the Cohort Study will begin implementation and the second round of data will be collected for the Panel Study. These two studies will generate a wealth of data on agriculture, nutrition, and health linkages in rural Uganda and allow detailed investigation of mechanisms by which integrated interventions impact maternal and child nutritional outcomes in particular. Capacity building will continue to be integrated into research activities, and additional training opportunities will be offered through BBNC and at HSPH.

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Makerere University
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Management Entity Information

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Other Team Members

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Nassul Kabunga (PhD)
Annet Kawuma (Msc)
Agaba Edgar (Msc)

Technical and/or Advisory Committee Information

Shibani Ghosh (PhD)
Jeffrey Griffiths (MD, PhD)

Map or List of Countries Where Work Uganda



List of Program Partners¹

Friedman School of Nutrition, Tufts University, Boston, US

Harvard School of Public Health, Boston, US

International Food Policy Research Institute (IFPRI), Washington, DC, US

Gulu University, Gulu, Uganda

Local government administrations

Uganda Chartered HealthNet (UCH), Makerere University, Kampala, Uganda

¹US universities and international partners by country

Acronyms

| | |
|--------------------|---|
| USAID | United States Agency for International Development |
| FANTA | Food and Nutrition Technical Assistance |
| IFPRI | International Food Policy Research Institute |
| SPRING Globally | Strengthening Partnerships, Results, and Innovations in Nutrition |
| UCH | Uganda Chartered HealthNet |
| WFP | World Food Programme |

XIII) Executive Summary

Makerere University, in collaboration with Tufts University and Harvard School of Public Health began the process of implementation of the birth cohort in Year 4. The birth cohort is an evaluation of USAID's Uganda Community Connector Project. During this time, the necessary tools and ethical approvals needed (from Makerere University School of Public Health and the Uganda National Council of Science and Technology) have been obtained. The research protocols and tools have been designed and pretested. Local government administrations of the 12 districts, in the north and southwestern parts of the country, where the birth cohort is to be implemented, have been oriented on the project. Collaborations with various government hospital labs which will process and store blood samples from the cohort, in the north and southwestern cohort implementation districts, have been established. Memorandum of understandings with other partners (IFPRI, UCH, Gulu University) involved in the cohort implementation have also been put in place. In addition to the above, planning meetings to guide the cohort implementation both the USAID Community Connector project and the USAID mission in Kampala have been conducted.

On the logistical part, procurements for all tools/equipment and supplies needed have been completed, and a full-time office administrator hired.

In addition to the birth cohort, a significant amount of planning, including but not limited to the renewal of the ethical approval, has been done for the panel survey. The panel survey has been planned to begin at the same time as it did in Year 3—October-December 2014.

Capacity building in the form of training of supervisors to implement the cohort was done. Enumerators, for the same cause, have also been identified and plans are underway to train them. One academic staff member from Makerere University staff was supported to attend a short course on epidemiology and nutrition at the Harvard School of Public Health during the summer.

Aside the above activities, work was done to understand the National Nutrition Policy and programming processes. This work involved formal in-depth discussions with key stakeholders in different government departments which subscribe to the Uganda Nutrition Action Plan. Discussions were also held with key staff from various local, international and UN agencies.

XIV) Program Activities and Highlights²

All of the required institutional review board approvals for the birth cohort implementation have been obtained. The necessary data-collection tools have been developed, pretested and translated into the local languages of the

²Summary of program activities for the year, no more than one page in length

respective cohort districts. Systems for the cohort implementation, from the sub-county to district levels, have been put in place. A central lab for the processing of blood samples was identified and the memorandum of understandings was shared. Local governments in the cohort implementing districts have been oriented on the birth cohort. Training of the birth cohort supervisors has been done. Data-collection enumerators have been identified.

For the panel survey, a renewal of ethics has been obtained from the necessary review boards.

One academic staff member was sent to Harvard for a short course in Epidemiology and Biostatistics.

To understand the National Nutrition Policy and programming processes, formal, in-depth discussions were held with the key personnel in different government sectors which subscribe to the Uganda Nutrition Action Plan: i.e., Ministries of Health; Agriculture; Education and sports; local government; gender labor and social development; trade and cooperatives and planning. Nongovernmental organizations and UN agencies which participated in this activity included: IFPRI; the USAID mission; USAID SRPING; FANTA; USAID Community Connector; Harvest Plus; UN REACH; and the World Health Organization. Analysis of the results arising from these discussions is being analyzed.

Key Accomplishments³

Specific accomplishments in Year 4 include: the obtaining of institutional approvals for the birth cohort; development and testing of data-collection tools and an electronic data-collection application; training of field supervisors; orientation of 12 district local governments about the birth cohort and setting up institutional collaborations with district-based laboratories for the cohort blood sample processing and storage. A clear cold chain system has been worked out, starting from the communities to the district labs and finally to Makerere University for storage. Contracting of analytical laboratories in the US and Germany is also in place. A significant amount of work has been done on the planning for the panel survey which is scheduled to begin before this calendar year ends (October- December 2014). Renewed ethical approval has been obtained for the panel survey.

On the capacity-building³ arm, a team of 19 field supervisors for the birth cohort study were trained on agriculture, nutrition and health linkages and other key areas that are integral to these linkages. These key areas included: water sanitation and hygiene; infant and young child feeding practices among others.

³Concise statement of achievements, limited to one page in length that focuses on outputs, not process, such as Feed the Future indicators and distillation of program achievements across all program activities. Reporting on numbers of project meetings is not an output.

Data enumerators for the birth cohort have been identified and preparations for their training have been finalized.

From Makerere University, Dr. Agnes Nabubuya completed a summer training session on epidemiology and global nutrition, management and food-borne infections from Harvard School of Public Health.

Finally, information to understand the national nutrition policy and programming processes from different government sectors, nongovernmental organizations and UN agencies in the country was collected.

XV) Research Program Overview and Structure

The Year 4 research program is an evaluation of the effectiveness of the integrated livelihood and nutrition interventions to improve maternal and child nutrition and health in rural Uganda. This work is an evaluation of the Uganda USAID Community Connector Project which implements these integrated activities. This evaluation takes on the form of a birth cohort and panel survey. Capacity building on nutrition, agriculture and health linkages is also on the agenda.

XVI) Research Project Reports⁴

a) Theme A Project I

The Birth Cohort Study

The Birth Cohort Study looks at the effectiveness of the integrated livelihood and nutrition interventions to improve maternal and child nutrition and health in rural Uganda, activities implemented by the USAID Community Connector project. The study assesses the effect of integration and/or collation of interventions, aflatoxin exposure and environmental enteropathy and coverage, uptake and adherence to intervention messages and activities and how these impact the maternal and child health and nutritional status. The cohort will be implemented in both USAID Community Connector Intervention and non-intervention districts; this will serve as controls. In place to implement the birth cohort are all the required ethical approvals; orientation of all the district local governments in the North and Southwestern parts of the country where the cohort implementation is to take place; establishment of the cold chain system (Figure 1) and collaborations with various district labs which will be involved in the blood sample processing and storage. The study supervisors have been trained and preparations to have the data enumerators trained are in place.

⁴Summaries of project activities, highlights and outcomes, not scientific reports or long detailed research papers, no more than one page per project.

Figure 1: Cold Chain for the northern districts of the birth cohort implementation

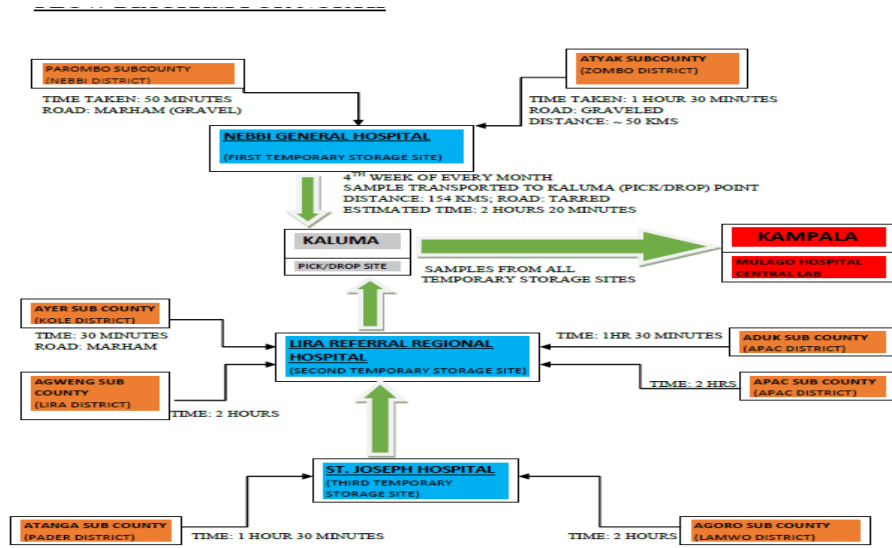
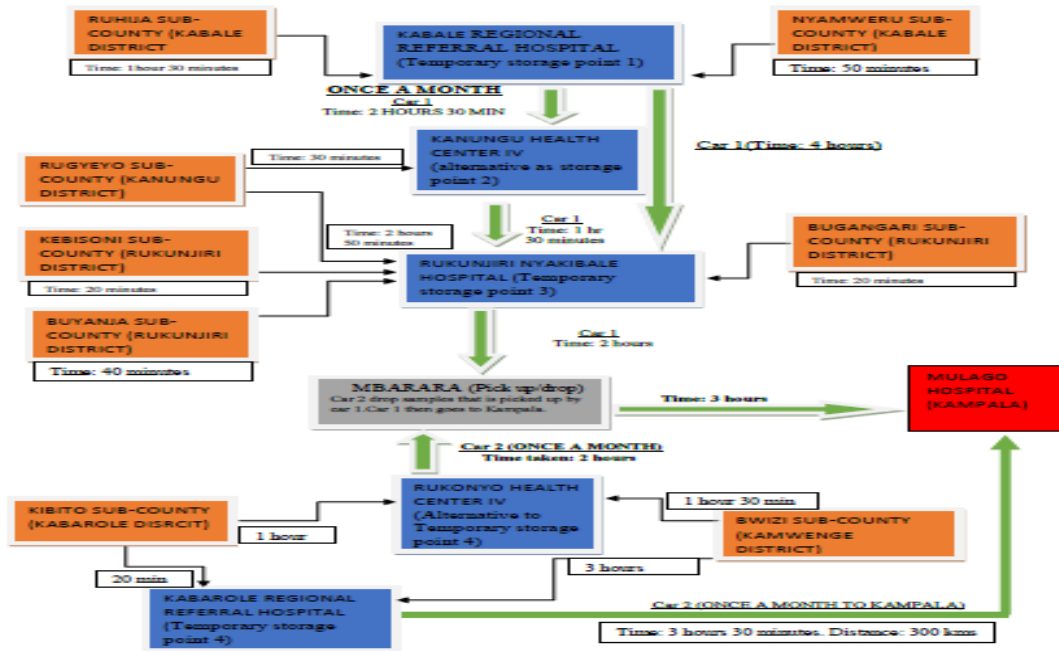


Figure 2: Cold Chain for the Southwestern districts of the birth cohort implementation



Project 2
The Panel Study

The Panel Study aims to evaluate the effectiveness of the USAID Community Connector interventions on household livelihoods. Contrary to the birth cohort, the Panel Survey collects data from a representation of randomly-selected households in only the Community Connector intervention districts. Renewal of the ethical approval to implement this study in addition to other logistical preparations has been made. The study will roll out at the same time the project did last year—in October.

XVII) Name of Mission and Award Number

USAID Washington, award number AID-OAA-L-10-00006; CFDA number 98.0001

XVIII) Human and Institutional Capacity Development⁵

a) Training by Country

i) Short-Term

Dr. Agnes Nabubuya from Makerere University attended a summer session in Public Health research studies at the Harvard School of Public Health. Dr. Nabubuya took courses in epidemiology, global nutrition, management and food-borne infections. Dr. Nabubuya's training is important in building a strong foundation for skills in multidisciplinary research in the areas of agriculture, nutrition and health, which she will pass on to her students at Makerere University.

ii) Long -Term

For the Year 4, Makerere University did not have a fresh intake of graduate students. Support was, however, maintained for the five continuing students studying under the disciplines of Nutrition and Agriculture at Makerere University. Of these five, three are male and two are female. The students are expected to complete their Master's degrees this calendar year.

b) Institutional Development

Training on agriculture, nutrition, and health linkages as well as key related areas including but not limited to sanitation, water and hygiene, infant and young child feeding practices, and intra-household decision-making on aspects of agriculture, nutrition, and health linkages was given to field supervisors for the birth cohort (eight males and nine females). The intensive one-week training was done jointly by teams from Makerere University, Harvard School of Public Health and Tufts University.

XIX) Technology Transfer and Scaling Partnerships

There was no involvement in technology development, transfer, or scaling.

XX) Governance and Management Entity Activity

⁵ This section is to serve as a compilation of all program training activities and not meant to duplicate the Capacity Building section under individual Research Project Reports. It can be in chart format.

Professor Bernard Bashaasha continued to serve in his role as the Principal Investigator at Makerere University. Dr. Florence M. Turyashemererwa serves as the Project Coordinator; Ms. Annet Kawuma as a Research Specialist, while Dr. Nassul Kabunga is a post-doctoral fellow. Dr. Shibani Ghosh and Professor Jeffrey Griffiths, based at Tufts University, are the Associate Director and Director, respectively. Dr. Chris Duggan and Wafai Fawzie are counterpart principal investigators based at the Harvard School of Public Health, while Dr. Ngunaratna Nilupa is a co-investigator.

XXI) Other Topics⁶

No issues to report

XXII) Issues⁷

No issues to report

XXIII) Future Directions

Makerere University will continue with the birth cohort implementation and panel surveys to evaluate the effectiveness of integrated agriculture, nutrition, and health linkages in Year 5. While the panel survey is bi-annual, the birth cohort is multiyear to allow a detailed investigation of the integrated nature of agriculture, health and nutrition interventions on maternal and child health and nutrition outcomes. Capacity building in the form of short-term and long-term training will also continue.

⁶ Such as Regional Centers of Excellence, impact assessment, gender initiatives

⁷ Such as financial, management, regulatory

Annual Report
Gulu University
Year 4 (2013-2014)
Feed the Future Nutrition Innovation Lab-Africa

**UPDATE ON PROGRESS WITH PRENAPS AND POSTNAPS STUDIES
IN GULU NORTHERN UGANDA**

Management Entity Information

GULU UNIVERSITY

PO BOX 166
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1. MR. BARNABAS K. NATAMBA

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UNIVERSITY SECRETARY
GULU UNIVERSITY

3. PROFESSOR NYEKO PEN-MOGI

VICE CHANCELLOR
GULU UNIVERSITY

Map or List of Countries Where Work

GULU: NORTHERN UGANDA



List of Program Partners⁸

Gulu Regional Referral Hospital

Acronyms

PreNAPs Prenatal Nutrition And Psychosocial Health Outcomes study
PostNAPs Postnatal Nutrition And Psychosocial Health Outcomes study

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⁸ US universities and international partners by country

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XXIV) Executive Summary

We would like to provide a quick update on the progress implementing our two projects supported by the Nutrition Innovations Laboratory for Africa (NILA). We started the PreNAPs study with the intention to collect pregnancy data on HIV-infected and HIV-uninfected pregnant women. We later requested an amendment to extend the study for approximately one year to collect additional data on lactating mothers and their babies. The PostNAPs study, therefore, was conceived as an extension of the PreNAPs study. A number of activities have taken place in the last year including: completion of data collection for the PreNAPs study and the ending of participant recruitment for the PostNAPs study; publication of our first paper and submission of our second paper from the PreNAPs study. Currently, data collection for the PostNAPs study is still ongoing and is anticipated to end in January 2015. In the following sections, we will highlight key accomplishments and highlights for each of these two studies: overall and then separately.

XXV) Program Activities and Highlights⁹

Over the year ending September 30, 2014 we have been able to continue to collect data for the postnatal component of the studies in Gulu. On March 19, 2014, we completed data collection for the PreNAPs study and have achieved 246 mother/infant dyads enrollment in the PostNAPs study. The PreNAPs study ended after generating 1756 observations from 403 pregnant women. We submitted our first manuscript from the PreNAPs study in December 2013. The publication was accepted in June 2014. In May 2014, we submitted our second manuscript and are currently revising that paper following reviewers' suggestions.

XXVI) Key Accomplishments¹⁰

- a)** Completed data collection for the PreNAPs study in March 2014.
- b)** Completed enrollment of participants into the PostNAPs study in March 2014.
- c)** Secured an associate award/funding to examine the influence aflatoxin exposure on maternal and infant growth.
- d)** Our first manuscript was accepted in June 2014.
- e)** Sent two of our research assistants for further training to the Bangalore Boston Nutrition Collaborative (BBNC) 2014.
- f)** Presented our findings to two scientific meetings: 1) Africa Region Chapter of World Psychiatric Association In Kampala, Uganda; and 2) Federation of American Societies of Experimental Biology meeting in San Diego, California.

⁹ Summary of program activities for the year, no more than one page in length.

¹⁰ Concise statement of achievements, limited to one page in length which focuses on outputs, not process, such as Feed the Future indicators and the distillation of program achievements across all program activities. Reporting on numbers of project meetings is not an output.

XXVII) Research Program Overview and Structure

- a)** Our program is led by a management committee that involves the Responsible Investigator (Barnabas Natamba); the University Secretary (Vincent Okoth-Ogola); and the Vice Chancellor (Professor Nyeko Pen-Mogi). Barnabas Natamba is the overall study manager and directs all study activities in Gulu. Seven (7) research assistants including a study manager, sub-study coordinators, cognitive development testers, a home visitor, and laboratory assistant work on the project.
- b)** Our research activities are closely coordinated with Gulu Regional Referral Hospital who provides us with space and access to research subjects.
- c)** Previously, we carried out our institutional review board (IRB) approvals with Gulu University's IRB committee but recently, this role has been taken over by St. Mary's Hospital at Lacor also based in Gulu Town.
- d)** On a daily basis we see on average four to six research participants.

XXVIII) Research Project Reports¹¹

a) Theme A

iii) Project I

(1) Name: The PreNAPs Study

(2) Description

The Prenatal Nutrition and Psychosocial Health Outcomes (PreNAPs) study is a two-year collaboration between Gulu, Cornell and Tufts Universities. The PreNAPs study's primary goals are: (a) to determine the differential impacts of food insecurity on gestational weight gain and prenatal depression in HIV-infected and HIV-uninfected pregnant women in Gulu, Northern Uganda; and (b) to clarify the mechanisms underlying the relationship between food insufficiency and/or insecurity and women's weight gain and/or depression. The PreNAPs study began enrolling pregnant women on October 10, 2012. The PreNAPs study completed participant recruitment on August 29, 2013 with more than 400 pregnant women enrolled. Data collection for the PreNAPs study ended on March 19, 2014.

(3) Collaborators¹²

Mr. Barnabas Natamba, a doctoral candidate at Cornell University's Division of Nutritional Sciences, is the Principal Investigator

¹¹ Summaries of project activities, highlights and outcomes, not scientific reports or long detailed research papers, no more than one page per project.

¹² Provide institutional affiliation and country.

and overall coordinator of the PreNAPs study. For his PhD Studies at Cornell, Mr. Natamba is advised by Dr. Sera Young, PhD, a research scientist at Cornell University's Ithaca Campus and co-chair of Mr. Natamba's doctoral dissertation committee.

(4) Achievements

- (a) Robust enrollment numbers of 403 pregnant participants.
- (b) Robust follow-up data, on average we collected four follow-up observations per woman.
- (c) Was able to develop a concept and obtain funding for the postnatal portion of the study.
- (d) Recruited and managed 10+ research assistants to work on the project.

(5) Capacity Building

- (a) The bulk of the data from the PreNAPs study will be used in Barnabas Natamba's doctoral dissertation.
- (b) We have trained local staff in study management, data collection, database design, and data entry.

(6) Lessons Learned

- (a) Establish strong linkages with local institutions, e.g. the Gulu Regional Referral Hospital, from where the study was implemented.
- (b) Develop strong links with supporting institution's staff which have direct or indirect relations with your project, e.g. nurses at antenatal and maternity wards, laboratory staff at the hospital clinical laboratory.

(7) Publications

- (a) **Natamba BK**, Kilama H, Arbach A, Achan J, Griffiths JK, Young SL. "Reliability and validity of an individually-focused food insecurity access scale for assessing inadequate access to food among pregnant Ugandan women of mixed HIV status." *Public Health Nutrition* 2014 Aug;:1-11.

(8) Oral Conference Presentations

- (a) **Natamba, BK**, Achan, J, Oyok, T, Mou, S, Gosh, S, Stoltzfus, R, ... & Young, S (2014, April). Maternal food insecurity, anemia, and social support are independently associated with prenatal depression among HIV-positive and HIV-negative women attending antenatal services in northern Uganda. *The FASEB Journal*, 28 (1 Supplement), 268-2.

ii) Project 2

(1) Name: The PostNAPs study.

(2) Description

The Postnatal Nutrition and Psychosocial Health Outcomes Study (PostNAPs) is a one-year collaboration between investigators at the two Cornell campuses (Weill Cornell Medical College in New York City and Cornell University at the Ithaca Campus). Other collaborators on the PostNAPs study are from Tufts, Columbia, Makerere and Gulu Universities. The PostNAPs study is conceptualized as a continuation of our current PreNAPs study cohort, which ends once pregnant women deliver. Although data collection is ongoing, the PostNAPs study completed enrollment on March 19, 2014 with 246 mother/infant dyads recruited.

(3) Collaborators

Key collaborators on the PostNAPs study include: Dr. Sera Young of Cornell University's Division of Nutritional Sciences; Dr. Nicole Sirotin, previously at Weill Cornell Medical College; Barnabas Natamba, a lecturer at Gulu University's Department of Public Health; and Dr. Elizabeth Widen of Columbia University.

(4) Achievements

- (a) Enrollment of 246 mother/infant dyads.
- (b) Completed collection of human sera on >90% of eligible sample at one month postpartum.
- (c) Integrated postnatal body composition assessments into the project.
- (d) Integrated neurocognitive assessments for infants at six and 12 months of age, and trained two research assistants to carry out these assessments.
- (e) Wrote a concept and secured funding for an associate award from United States Agency for International Development (USAID) East Africa Mission office to investigate the influence of perinatal aflatoxin exposure on changes in maternal and child anthropometry.

(5) Capacity Building

- (a) Further training and support to project staff on data collection, entry and overall project management.
- (b) Supported two project staff (Ms. Winifred Achoko & Ms. Claire Biribawa) to travel to India and take part in the BBNC 2014 program.

(6) Lessons Learned

- (a) There is always a need to manage expectations among investigators, e.g. authorship roles, and for the sharing of project-related intellectual properties early in the project.
- (b) Develop clear criteria for identifying, expectations, and roles of students interning for the project from the US side.

(7) Publications

- (a) The team is working on submitting PostNAPs project abstracts for the Federations of Experimental Biology Meeting in Boston in March/April 2015. We anticipate to present approximately five papers/abstracts at this conference.

2) APPENDICES

- A. Concept for early childhood development (ECD) sub-study within the Uganda birth cohort
- B. Three-year work plan for the ECD project
- C. Three-year budget estimates and justification for the ECD sub-study

Annual Report
Tuskegee University
Year 4 (2013-2014)
Feed the Future Food Innovation Lab-Africa

Program Activities and Highlights

Graduated an MS Student in Foods and Nutritional Sciences
This student won an award for his work at the International Food Technology (IFT) conference in New Orleans, LA.

Research Project Reports

Worked on formulation of complementary food for Ugandan infants' 2-36 months using orange sweetpotato flour and sweetpotato leaf flour as food source iron and beta carotene supplementation.

Human and Institutional Capacity Development

a) Training by Country

i) Short-Term

- (1) Number (by gender) **15 female 10 male**
- (2) Purpose: Brain storming and Pre-planning training for the workshop on **"Nutrition and Food Safety for Food Processors and Consumers"**
- (3) Home institution, if applicable: **Makerere University**
- (4) Training institution or mechanism: **Food Science Department, Tuskegee University**

ii) Long -Term

- (1) Number (by gender): **4 males 2 females**
- (2) Purpose: **to increase number of graduates in Food and Nutritional Sciences**
- (3) Field/discipline: **Food Science, Nutrition, Extension**
- (4) Home institution: **Makerere University**
- (5) Training Institution: **Makerere University and Tuskegee University**

Future Directions: Collaborate with Makerere University to conduct workshop and training in Uganda on issues of HACCP plan development at the Commercial Food Preparation Lab and the importance of in Food product development, safety and sanitation and to identify possible solutions to local issues.