

Annual Report
Harvard School of Public Health
Year 3 (2012-2013)
Feed the Future Innovation Labs for Collaboration Research-Asia

Principal Investigators:

Wafaie Fawzi, MBBS DrPH
Harvard School of Public Health
665 Huntington Ave
Boston MA 02115
Email: mina@hsph.harvard.edu

Christopher Duggan, MD MPH
Harvard School of Public Health
665 Huntington Ave
Boston MA 02115
Email: christopher.duggan@childrens.harvard.edu

HSPH Team Members:

Andrew Thorne-Lyman, ScD MHS, Email: ant268@hsph.harvard.edu
Lindsey Locks, MPH, Email: lml395@mail.harvard.edu

Team Members in Nepal

Dr. Prakash Sunder Shrestha, MD, Email: shresthaps@hotmail.com
Dr. Ram Chandyo, PhD, Email: ram.chandyo@cih.uib.no
Dr. Manjeswari Ulak, Email: manjeswori@gmail.com
Dr. Merina Shrestha, MBBS, MD, Email: drmerinashrestha@gmail.com

Team Members in Norway

Tor Strand, Email: tor.strand@cih.uib.no
Sigrun Henjum, Email: sigrun.henjum@hioa.no
Ingrid Kvestad, Email: ingrid.kvestad@cih.uib.no

I) Executive Summary

The work of the Harvard School of Public Health (HSPH) and its partners in Nepal focuses on understanding the complex relationships between diet, socioeconomic status, nutritional status, and health. During Year 3 of our work for the Feed the Future Innovation Lab, we completed a follow-up survey of mother-child pairs, which will enable us to better understand the potential links between maternal diet in early childhood life and nutritional outcomes. We also worked with colleagues at the Institute of Medicine in Nepal and colleagues from Norway to field an additional component of the survey assessing the cognitive development of children at six years of age—an addition that will enable us to explore many topics of relevance to the 1,000 Days Initiative and efforts to understand the importance of nutrition in early childhood and implications for later development. We also completed and submitted several papers for peer-review journals from the baseline survey and continued to work closely with our colleagues in Nepal to develop capacity related to the analysis of nutrition data.

II) Program Activities and Highlights

Our research team is composed of members from the Harvard School of Public Health, the Institute of Medicine at Tribhuvan University in Nepal, and the University of Bergen in Norway. In Year 3 of the project our research activities involved: (1) analyzing results from a baseline survey conducted among 500 mother-infant pairs in Bhaktapur, Nepal; (2) implementing a follow-up survey of the same households; and (3) building the capacity of our colleagues in Nepal to undertake research related to nutrition, agriculture, and health.

The main objectives of our research activities are as follows:

- Improve methods used to measure diet in Nepal;
- Strengthen understanding of the links between diet, food security and nutrition status in mothers and children in Nepal; and
- Capacity building of IOM at Tribhuvan University, our main organizational partner in Nepal.

At the end of Year 2 of the project we had designed the follow-up survey, received Institutional Review Board (IRB) approval from relevant institutions, and hired the staff to implement the survey. One exciting development that occurred since our last report is that our colleagues from Norway received a grant from GC Rieber Research Fund, a private Norwegian research fund, that allowed us to also add assessment of cognitive development outcomes among the same children included in our follow-up survey.

Rather than pushing forward that immediate collection of data over a two-month period, as originally planned, we therefore decided to spread out data collection over the course of the year (since the assessment of children's development had to be conducted by trained specialists and conducted at a specific age following the baseline survey). An additional benefit of collecting data over the entire year was that we now have the ability to examine seasonal patterns of dietary consumption in the follow-up survey.

Data collection from the original households is now complete. We were able to collect data on 367 of the original 500 households.

III) Key Accomplishments

- We completed data collection for the follow-up study of original women and children in September 2013.
- One research paper based on our work in Bhaktapur was completed and submitted to journals and three more are nearly completed (details below).
- In addition, one letter to the editor drawing on our work in the Innovation Lab was recently accepted for publication in the *Journal of Maternal & Child Nutrition*.
- We produced two research-to-action briefs
- Our colleagues from Norway were able to raise complementary funding to collect data on cognitive development outcomes of the children in our survey. This will enhance the analyses that we are able to do, as we will be able to link nutrient and food intake as well as

nutritional status with cognitive development outcomes. The primary person leading this research in Nepal is Dr. Merina Shrestha, who also attended coursework at HSPH last summer.

IV) Research Program Overview and Structure

Our work involves strong collaboration with colleagues at the Institute of Medicine in Nepal and colleagues at the University of Bergen, Norway. All partners have a role in the design and implementation of research and the drafting of research manuscripts.

V) Research Project Reports

In our Year 3 Work Plan we had outlined a number of paper topics that we planned on working on over the coming year. We have significantly advanced most of these topics, though the direction of some topics changed as the analyses evolved. An update on papers (numbered as originally listed in the Work Plan) and current status follows. Drafts of the papers are attached in the Annex:

Paper 1. Maternal anemia and iron deficiency and relationships with dietary intake:

This paper was submitted to the *British Journal of Nutrition* and received favorable reviews. We are in the process of revising and resubmitting the paper for potential publication in that journal.

Paper 2. Dietary diversity scores and probability of nutrient adequacy:

This paper is nearly completed for submission. The primary author went on maternity leave in August 2013 and was in the process of incorporating the feedback of other authors on the paper. We expect that the paper will be submitted within the next two months.

Paper 3. Dietary diversity scores and their relationship to anemia and anthropometry:

This paper is nearly completed and will be submitted to the *Journal of Nutrition*. The manuscript emphasizes how correcting for within-person measurement error can strengthen the association between dietary measures and nutritional status.

Additionally, we wrote a letter to the editor of the *Journal of Maternal & Child Nutrition* about the application of this concept to infant and young child feeding indicators, with the support of this grant, which was accepted without revision and should be published within the coming months.

Paper 4. Maternal dietary patterns and anthropometric indicators in mothers and children:

Data analysis for this paper was unfortunately held up because of the delays in collecting follow-up data. Now that data collection is complete, we are in the process of analyzing the data for this paper. Early results from the follow-up survey, presented by Ram Chandyo at the Scientific Symposium in Nepal, suggest that the prevalence of overweight women in our study now exceeds 43% (also written up in the brief brief). We plan to use our dietary intake and socio-economic data as an opportunity to analyze the factors that are associated with the change in overweight individuals in this population.

Extra Paper: Anemia and iron deficiency are three-fold higher among breastfed infants than their mothers in Bhaktapur, Nepal

This paper, led by Ram Chandyo, explores the prevalence and risk factors for iron deficiency and anemia among lactating women and their infants.

VI) Capacity Building

Two students attended summer courses at the Harvard School of Public Health. Dr. Arun Sharma is a pediatrician and lecturer at the Institute of Medicine. He was able to develop skills in the analysis of nutritional data that he plans to use in publishing papers and in his teaching of undergraduates and graduate students. Dr. Manjeswari Ulak has been part of our research group in Bhaktapur since the start of the Innovation Lab work in Nepal. She took coursework related to Global Nutrition and during her time spent in Boston, worked with our team on moving forward with analyses for a manuscript on vitamin B12 status of children in Bhatkapur using our project data.

VII) Lessons Learned

Prior to implementing the follow-up survey, we undertook a quick study of 50 households to estimate how many of the original 500 households we might be able to identify at follow up. From this study we estimated that we would be able to find 400 or the original 500 households. We ultimately found 367 households, since more households than expected had moved out of the area. We suspect that much of this migration was due to the rapid growth and development of the Kathmandu Valley. Future longitudinal studies in urban areas should take into account high potential for population movement. Interestingly, our initial results from the follow-up study suggest that selection bias toward better-off households is not as great as we had anticipated—our analyses will use sophisticated methods such as inverse-probability weighting to understand and account for potential selection bias.

As one of the few cohort studies to be conducted in urban areas in South Asia, the willingness of households to continue to participate in the study was uncertain, particularly since we requested blood samples and extensive participation in cognitive development assessments. However, the strong relationship built between our Nepali collaborators and the community of municipal Bhaktapur resulted in high rates of participation among the families we were able to find.

Another major lesson learned relates to our team's ability to adapt and translate the Ages & Stages 3 Questionnaire (ASQ-3) for use in a Nepali context. The ASQ-3 has been validated for use in Western countries, and our colleagues have used it in India as well. To our knowledge, our team's adaptation and translation of the ASQ-3 is the first for the Nepali context, and our preliminary findings indicate that the tool can be appropriately used in Nepal. In addition to the ASQ-3, we also assessed child development using two "gold standard" assessment tools—the Bayley-III & NEPSY-II (A Developmental NEuroPSYchological Assessment), and we plan to formally validate the ASQ-3 against these "gold standards." The ASQ-3 will likely prove a

promising tool that could be used in surveys and assessments in low-resource settings because of its quick completion (20 minutes) and the fact that it can be conducted by a trained field worker.

VIII) Presentations and Publications

Dr. Ram Chandyo presented on “Socioeconomic status, food security and anemia among mothers in Bhaktapur, Nepal” at the "Science and Policy for Health, Agriculture, Nutrition & Economic Growth" Scientific Symposium in Nepal.

A letter to the editor, entitled “Is the strength of association between indicators of dietary quality and the nutritional status of children being underestimated?” about the need to address measurement error in the measurement of dietary diversity scores was submitted to and accepted by the *Journal of Maternal & Child Nutrition*.

Two briefs were prepared based on our work.

In addition, one manuscript was submitted to a peer review journal and three are near completion.

ANNUAL REPORT

Johns Hopkins Bloomberg School of Public Health (JHBSPH)

Year 3 (2012/2013) CORE & RFA Activities: Nutrition Innovation Lab – Asia

Principal Investigator: Keith P West

Co-Principal Investigators: Rolf Klemm, Ramesh Adhikari, Devendra Gauchan

Co- Investigators: Swetha Manohar, Ruchita Rajbhandary, Raman Shrestha

Overall Objective: Build capacity and conduct research to evaluate agricultural and nutrition interventions whose delivery and integration may help communities and households be more food secure, better nourished and healthier early and later in life.

Proposed and Actual Activity as per the Year 3 Work Plans

Section 1: Research Activities

Objective 1. Organize an annual scientific symposium or “evidence summit” to facilitate the rapid sharing of research findings and innovative solutions, stimulate cross-dialogue among researchers and program implementers from agricultural, food security, health and nutrition sectors in Nepal.	
PROPOSED	ACTUAL
<ul style="list-style-type: none">• Draft and distribute symposium announcement and request for abstracts from key nutrition, agriculture, food security researchers and research institutions working in Nepal.• Conduct symposium.• Draft, translate and distribute proceedings both in English and	<ul style="list-style-type: none">• Organized and conducted a two-day, abstract-based Scientific Symposium entitled, “Science and Policy for Health, Agriculture, Nutrition & Economic Growth” on August 13th & 14th, 2013 co-hosted by Nepal’s Institute of Medicine, the National Agricultural Research Council and Johns Hopkins University. This year the Symposium included a two multi-sectoral panels during the plenary session and during a session entitled ‘National Policy Responses to “the science.”’ There were 18 oral presentations on Nepal-based and/or relevant research and 10 poster presentations. The Symposium was attended by 220+ participants on both days by Government of Nepal

Nepali.

(GON) officials, Nepal academia (from the faculties of community medicine, public health, agriculture and veterinary science), policy makers, INGOs, development partners and international experts.

- Materials and presentations from the Symposium are available on the Nutrition Innovation Lab website.
- Proceedings of the Symposium are currently being drafted as the event took place in August 2013 and will be published and distributed by the end of October 2013.
- A Symposium brief is being prepared for submission to the Journal of Agricultural Economics, a Nepali journal.

Lessons Learned

- There is a growing interest in this area of research, as evidenced by more than double the number of participants attending the events. Plans to ensure adequate space and accommodation for interested participants in the future have been made.
- Due to time constraints, engaging co-hosts in a meaningful way remains to be a challenge despite their commitment and interest in serving as co-hosts of the event.
- Allocating time for poster presentations facilitated a more meaningful and engaged interaction between the audience and poster presenters.
- Engaging high-level policy makers from the Ministry of Health & Population (MoHP), Ministry of Agriculture (MoAC), and National Planning Commission (NPC) at the secretary/joint-secretary level created a lasting impression on the audience because of the audience's diversity. Students and Nepali academia aside from the International Non-governmental Organization, Non-governmental Organization and development partner communities were able to have candid discussions about agriculture's role in improving nutrition, the type of science that would contribute to understanding this and current policies and multi-sectoral programming taking place in Nepal.
- Abstract-based selection of oral presentations continues to be the best method of screening relevant and higher-quality research.

Solutions/Resolutions

- Continue organizing annual symposiums that bring together stakeholders in the agriculture

and health and nutrition sectors interested in sharing relevant research on the linkages between agriculture and nutrition in 2014 in continued partnership with International Organization for Migration (IOM) and Nepal Agricultural Research Council (NARC). Identifying key faculty within IOM and NARC to be part of the abstract selection committee will further engage co-hosts and ground Nepali academics in this stock-taking exercise of the available literature on the ag-nutrition pathway.

- Next year, a strict format for posters will be enforced to allow for the content of the posters to be evaluated for their scientific rigor.
- In the future, a suggestion from the audience that we anticipate following up on is engaging other stakeholders from the Ministry of Education, the Ministry of Local Development and other concerned ministries engaged in Nepal’s Multi-Sectoral Nutrition Plan during policy panel sessions.
- There may be utility in the years to come to have a one or two day pre-symposium workshops with abstract presenters in Kathmandu, as a capacity-building activity, to review final presentations, recommend improvements in how methods, results and conclusions are presented and develop and ensure presentation cohesiveness within each symposium session

Objective 2. Disseminate research findings from dietary intake, nutritional status, and nutrition intervention studies in policy-friendly formats.

PROPOSED	ACTUAL
<ul style="list-style-type: none"> • Finalize and distribute three Research-to-Action briefs that have been drafted. • Draft and distribute an additional three Research-to-Action briefs. 	<ul style="list-style-type: none"> • Four Research-to-Action briefs were drafted highlighting Nepal Nutritional Intervention Project-Sarlahi (NNIPS) research findings relevant to <i>Nutrition Collaborative Research Support Program</i> (NCRSP) objectives, but need to be modified before publication. • A research brief describing the Policy and Science for Health and Nutrition (PoSHAN) Community Studies activity was drafted, published and disseminated during the August 2013 Scientific Symposium.

Lessons Learned

- With limited staff in the beginning of Year 3 and with the startup of PoSHAN Community Study sites in 21 districts, these briefs were difficult to prioritize. However, they continue to appear to be an excellent method to disseminate policy-relevant research.

Solutions/Resolutions

- Plans include research-policy briefs as an output for research assistant and interns engaged in the Nutrition Innovation Lab for the year to come.

- Publish five research-to-action briefs during Year 4.

Objective 3. Conduct annual panel survey to serve as the first round of data collection for the NCRSP/JHU (Johns Hopkins University) research.

PROPOSED	ACTUAL
<ul style="list-style-type: none"> • Identify and setup a Kathmandu office. • Recruit administrative and research team staff for NCRSP Kathmandu office. • Create training schedule and manual. • Purchase equipment required for annual survey (height boards, Hemocue machines, tape measures, calipers, scales). • Conduct training for data collection teams with survey firm selected. • Conduct data collection for annual survey. • Initiate and complete data cleaning, checking and entry process. • Analyze data from annual panel survey. • Commence paper-writing for data collected from annual survey well 	<p>Setup of Nutrition Innovation Lab/JHU Office & Personnel</p> <ul style="list-style-type: none"> • Recruitment and hiring of a Senior Field Manager, Research Assistants, Public, Finance/Administrative Officer, Database Programmer among other consultative staff has been completed. • Training for staff hired conducted and continues on an “as needed” basis. • Identified and setup office in Oasis Complex, Patan Dhoka. • All equipment required for annual panel survey: micro cuvettes, salt testing kits, lancets, tape measures, etc. have been procured. <p>PoSHAN Community Studies</p> <ul style="list-style-type: none"> • Request for proposals released and competitive selection of data collection firm completed in October 2013–New ERA Pvt. Ltd. • Development, vetting and finalization of data collection tools for PoSHAN Community Studies. • Pre-testing of data collection tools completed in the Sunsari and Dhading districts and revisions to questionnaires completed.

<p>as the identification of field sites.</p>	<ul style="list-style-type: none"> • Ethical clearance from Nepal Health Research Council completed. • Four weeks of training and standardization of 90+ data collectors in collaboration with New ERA. • Data collection began in May 2013 for first annual panel survey in 21 districts of Nepal in the mountains, hills and terai, and was completed in August 2013. • Quality assurance visits to more than 15 districts completed by Nutrition Innovation Lab/JHU staff and to all districts by New ERA staff. • Preliminary data reviewed–frequency distributions completed. • Received final data from New ERA in September 2013, data transferred and converted to SQL database, checked and frequency distributions completed. • Analytical plans for the first set of papers characterizing PoSHAN Community Studies’ mother and < 5 children population’s nutrition status and dietary patterns completed.
--	---

Lessons Learned

- The cost of office space in the Kathmandu valley has drastically increased, along with longer hours of load shedding (power cuts) over the past two years, thus making it essential to have reliable generators and uninterrupted power supply (UPS) devices.
- It has been highly valuable working through and with a research firm like New ERA to hire data collectors, implement data collection, and provide the logistical support required for this activity.
- Conducting this national study across diverse terrains just before and during the monsoon season has been challenging. The size of the study also warranted a large staff of 96 data collectors. Training and standardizing data collection methods (especially standardizing anthropometric measurements) was a difficult task despite it ultimately being accomplished.

- Mandating structure, quality and providing detailed and specific instructions for training, data management and quality control procedures to subcontracting firms during the initial and planning stages of the annual panel survey carried the project a long way to ensure that protocol was followed. Delays occurred as a result of this, however, quality of data and structure of the project was able to be maintained.
- Since land measurements vary across agro-ecological zones, there exists a need to document these measurements within each zone and to standardize them across zones to ensure accurate measurements are used during analysis of the data.
- Overall, there is a very low refusal rate across all 21 sites. The interviews however, due to their comprehensive nature, are rather long (2.5-3.5 hours to interview a complete household, which includes household interview, women and children interviews). Long interviews allow for fewer to be done a day and brings up the issue of interviewee fatigue and whether the small token offered (toothbrush/toothpaste set for children and soaps for the household) is adequate in the long run.

Solutions/Resolutions

- An office building with several other United States Agency for International Development (USAID) projects running within its premises was identified as the Kathmandu office for the Nutrition Innovation Lab/JHU office to accommodate a staff of eight full-time members and one part-time staff member. It will soon also contain the server that will house the PoSHAN Community Studies database. The building is fitted with a generator and UPS devices have been procured for the office.
- Continue working with New ERA to carry out the annual surveys for the PoSHAN Community Studies.
- Plan for a field departure date of May 1st to ensure that data collection takes place during the same season but that heavy rainfall, to the extent possible, is avoided.
- Complete editing and translation of all survey documents—training manuals, manual of operations and questionnaires—by February 2013 and have adequate (two to three) meetings with the New ERA core field staff to review materials together instead of doing this separately with different members of the team.
- Complete standardization exercises for anthropometry earlier in the training to allow sufficient time for retraining staff as needed (this was done during Year 2, however training time was lengthened).
- Standard land measurement forms were developed and are being used to document how land measurement is completed in each of the sites. Supervisors document this by engaging agricultural experts (agricultural extension workers/ expert farmers). A record is maintained and conversions are completed during data entry and analysis.
- Ongoing discussions about questionnaires and ensuring community engagement in the research continue. Simple pamphlets with research findings are planned to be

developed for distribution to the community during dissemination efforts.

Objective 3. Conduct data collection in identified sentinel sites to provide seasonal and detailed information about agriculture-program-household dynamics that may affect diet and nutritional status of families.

PROPOSED	ACTUAL
<ul style="list-style-type: none"> • Embed Nepali Technical Assistance Group (NTAG) QC staff into survey data collection teams to conduct a formal evaluation of district town size, Village Development Committee (VDC) access, facilities, logistics, taking digital photographs, etc. in collaboration is key. Key contacts at the district and VDC sites will also be noted. • Identify 3 VDCs to serve as surveillance sites. • Set up 3 VDC surveillance site offices. • Recruit VDC level data collection and supervisory staff for surveillance sites. • Conduct 2 rounds of seasonal data collection in selected surveillance sites. 	<ul style="list-style-type: none"> • One sentinel VDC (3 wards each) was selected from each of three zones (mountains, hills and terai), based on average comparability. We examined extant and publicly available census and other Bureau of Statistics data for the VDC distributions within each zone for population density, age and sex, and other factors. The VDC which most closely approximates the center of these distributions in each zone, considering access, was identified as the sentinel site in the zone. In the end, the sites selected were: Mahatgaun (Jumla), Sitapur (Arghakhanchi) and Saigaun (Banke). • The Senior Field Manager from the Nutrition Innovation Lab and two senior field staff (all hired through NTAG) made field visits to each of the sentinel sites to attain permission from district level officials (the District Health Office, Chief District Officer and District Development Office) to setup the PoSHAN sentinel sites within those districts, advertise for local staff, conduct interviews together with district-level officials to ensure transparency in recruitment procedures and involve district officials. • In total, 29 field staff were recruited for the first round of sentinel site data collection. The increase in staff numbers was due to the imperative need to complete data collection before the 1-2 week-long festival period of Dhasain (early October). • 3 office spaces in each of the sentinel sites have been identified.

	<ul style="list-style-type: none"> • Due to delays related to subcontracts being awarded to the annual survey firm, New ERA, a need to review, revise and reformulate questionnaires, among other issues, only one round of sentinel site data collection took place during this fiscal year.
--	--

<p>Lessons Learned</p> <ul style="list-style-type: none"> • The need to engage district level officials and ensure their buy-in to the research is invaluable. To a large extent, this drives the success of field teams being able to conduct the data collection efficiently. • It would be best to set up offices when the field teams have been consolidated to three to four people per site who are local and/or relocated to the research sites permanently. This ensures that there will be someone present to check in on the offices even during periods when there is no ongoing data collection. • Within each community, having data collectors who were residents within the VDC or from the surrounding districts drastically made the rapport-building with the community and data collection teams more seamless. • There is seasonal migration of residents during certain periods of the year, for example, in Jumla, where residents from lower altitudes of this mountain district, travel further to even higher altitudes to harvest their potato crop. This seasonal migration results in losing a small percentage of households in our longitudinal cohort. 	
--	--

<p>Solutions/Resolutions</p> <ul style="list-style-type: none"> • Continue relationship-building efforts with district level officials, plan accompanied monitoring visits by district level officials in sentinel sites, and conduct dissemination activities with key stakeholders at the district level. • Office leases to commence in December 2013, a month before the second round of sentinel data collection and when data collection teams are consolidated. • Field team consolidation will take place on the basis of performance but also preference will be given to local staff and/or staff willing to relocate to sentinel sites. • Make arrangements in the future (budgetary allocations) to contact respondents who may be reached within the district even if they are not currently residing in their home in the sentinel VDC. 	
--	--

Objective 4. Disseminate findings from Year 1 of NCRSP research conducted by JHU to pertinent stakeholders.

PROPOSED	ACTUAL
-----------------	---------------

<ul style="list-style-type: none"> Dissemination meeting with key stakeholders (policy makers, program implementers and researchers within national research institutions). 	<ul style="list-style-type: none"> Dissemination meetings have not yet occurred as the annual survey data was just recently received in September 2013.
<p>Lessons Learned</p> <ul style="list-style-type: none"> Through discussions with previous training candidates, specific procedures were discussed to ensure wide dissemination within the central government offices—specifically to coordinate the event through the Child Health Division, Department of Health. 	
<p>Solutions/Resolutions</p> <ul style="list-style-type: none"> Dissemination activities with all key stakeholders will take place between December 2013-January 2014 when the first panel survey data are cleaned and analyzed following the procedures recommended by our local counterparts. 	

Section 2: Capacity Building

<p>Objective 1. Help build the ability to conduct population-based nutrition research.</p>	
<p>PROPOSED</p>	<p>ACTUAL</p>
<ul style="list-style-type: none"> Provide short-term training in epidemiology, biostatistics and data analysis for a student or faculty member from an academic or research institution at the Johns Hopkins Bloomberg School of Public Health (JHBSPH) Summer Graduate Institute. Develop as a member of the NCRSP partner team curriculum for a short training course in research methodology to be conducted in Nepal. One candidate for the summer training program at JHBSPH identified. 	<ul style="list-style-type: none"> Identified and trained one Nepali candidate—a junior faculty engaged with teaching and curriculum development from the Institute of Medicine. The candidate attended the three-week Summer Biostatistics and Epidemiology Training Program. The Nepali candidate identified and supported by the Nutrition Innovation Lab to pursue a Master of Public Health has matriculated from the degree program and now serves as a Public Health Scientist for Nutrition Innovation Lab research activities. A NTAG staff member was identified as having training needs in anthropometry, anemia testing and a general need for exposure to community research sites. This staff member visited Sarlahi

<ul style="list-style-type: none"> • One to two candidates identified to visit the Sarlahi district’s “living laboratory.” 	<p>for one week and was provided training and mentoring by senior field supervisory staff.</p>
<p>Lessons Learned</p> <ul style="list-style-type: none"> • The short-term epidemiology and biostatistics training continues to be valuable to training candidates. They also are looking forward to applying some of the skills acquired not only to their roles within government/ national academic institutions but also are enthusiastic about contributing to Nutrition Innovation Lab activities such as reviewing abstracts for the Scientific Symposium and potentially performing analyses on some of the PoSHAN Community studies data. • There is a need to keep track of and stay in contact with alumni of the training programs to engage them on a regular basis—they are a wealth of knowledge and in some cases, belong to or are attached to the stakeholder community which we hope to engage in disseminating our research. 	
<p>Solutions/Resolutions</p> <ul style="list-style-type: none"> • Quarterly meetings with training candidates have been planned—one in August 2013 has already taken place with JHU training candidates and another event was organized by Tufts University for all Nutrition Innovation Lab training candidates in September 2013. Both events were successful and were received positively by candidates. 	

OUTPUTS:

1. Vetted study protocol & questionnaires for the PoSHAN Community Studies’ 1st annual & sentinel surveys
2. NHRC and JHU International Review Boards’ approval
3. PoSHAN Community Studies’ Training Manual

4. PoSHAN Community Studies' Manual of Operations
5. PoSHAN Community Studies' Anthropometry Standardization Protocol
6. PoSHAN Community Studies' Annual Panel Survey (P1) Data Management Plan
7. PoSHAN Community Studies' Database in SQL
8. PoSHAN Community Studies' Analytic Database in STATA
9. PoSHAN Community Studies' Annual Panel Survey Analysis Plan
10. Scientific Symposium 2013: "Science and Policy for Health, Agriculture, Nutrition & Economic Growth"
11. Proceedings for Scientific Symposium 2013, "Science and Policy for Health, Agriculture, Nutrition & Economic Growth" (being developed)
12. Rajan Paudel, Institute of Medicine (IOM), graduate of the JHBSPPH Summer Institute: Epidemiology and Biostatistics Training Program
13. Dr. Raman Shrestha, graduate of the JHBSPPH Master of Public Health Program

Vignettes

Year 3 brought with it many lessons learned, mostly related to setting up sites in the field across the varying terrains of Nepal and how best to work through the numerous partners the Nutrition Innovation Lab collaborates with.

Travel to the 21 PoSHAN Community Studies' sites is challenging during data collection due to weather and distance from central locations. However, the establishment of one team of data collectors to a VDC for the duration of the data-collection period for the annual survey has allowed for teams to be embedded in the research sites and resulted in ease of accessing households. As mentioned above, the establishment of local teams for the sentinel sites seems to be the best step forward with regard to increasing community support and engagement in research activities.

There have been several changes within the Child Health Division at the Department of Health with a new Chief of Nutrition, Director and Director General, thus there continues to be a need to build relationships within the GON. With change in project branding, the need to ensure that the project continues to gain visibility with its new branding remains important. It appears, however, that these efforts have mostly been successful with the additions of the Nutrition Innovation Lab representatives in different technical working groups comprised of government officials, development partners and other technical experts who provide input into the

development of different nutrition policies. Representatives from the Nutrition Lab have been included in the National Nutrition Surveillance Working Group and the Maternal Nutrition Strategy Working Group and lately, a proposal has been drafted for inclusion of someone from our group in the Multi-Sectoral Information Management and Planning Working Group for MSNP.

Additionally, establishing concrete relationships with clear, delineated tasks for Johns Hopkins' primary partners—NTAG, NNIPS and New ERA—has been a primary focus of the year past. Due to a heavy reliance on each of these organizations to provide Human Resource support, there has been a need to align policies, procedures and protocols for staff hired across these groups for the purpose of working on Nutrition Innovation Lab activities.

***Tuskegee University
Annual Report 2013
Year 3 (2012-2013)***

Feed the Future Innovation Labs for Collaboration Research-Asia

The primary activities in Y3 at Tuskegee were long term training.

- (1) Number (by gender): **1 male, 0 female**
- (2) Purpose: **to increase number of graduates in Food and Nutritional Sciences in Nepal**
- (3) Field/Discipline: **Food Science**
- (4) Home Institution: **Nepali Technical Assistance Group (NTAG)**
- (5) Training Institution: **Tuskegee University**

Annual Report
Purdue University
Year 3 (2012-2013)

Feed the Future Nutrition Innovation Lab - Asia

Principal Investigator:

Gerald Shively

Purdue University, Department of Agricultural Economics

403 West State Street

West Lafayette, IN 47907

Email: shivleyg@purdue.edu

Objective 1 (as stated in Year 3 Work 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 levels. The key objective is to develop an empirically-based and data-driven understanding of the overlap between agricultural issues and health/nutrition issues in Nepal, so as to improve the effectiveness of nutrition policy in Nepal.

Substantial progress achieved and efforts continuing, as detailed below.

Specific Objectives (as stated in Year 2 Work Plan): Data Collection

No primary data collection is envisioned at this time.

No primary data collection (survey) activities were undertaken in Nepal during the year. However, we did work with partners in the Ministry of Agriculture to obtain what we

expect will be a very important set of monthly data on agricultural prices covering more than 45 districts and 20 commodities. To the best of our knowledge these data have not been previously released to the public or analyzed in detail.

Specific Objectives (as stated in Year 2 Work Plan): Capacity Building

Increase the capacity and effectiveness of research institutions in Nepal and train students at the graduate level to become contributing members of the global community fighting against hunger and malnutrition.

Progress achieved, as detailed below.

Introduction/Overview of Work Plan Rationale/Objectives

Nepal faces a number of development challenges, including poor agricultural performance, and chronic and widespread child malnutrition. This Work Plan aims to study available evidence regarding food security, malnutrition and related topics in Nepal and to undertake primary research on key issues relating agriculture to nutritional outcomes, while simultaneously engaging in training to improve knowledge and capacity in Nepal. We attempt to work closely with the ME (Management Entity) and project partners in Nepal to build new collaborations and strengthen existing collaborations with Nepalese partners around the topic of agriculture and nutrition. Work Plan activities are designed to be fully aligned with Nepal's Integrated Nutrition Plan (INP) goals and priorities as they relate to agriculture

Section I: Research Activities and Progress on Specific Objectives

Focal area: *Identification of Priority Research Areas*

Activity 1: These activities were completed in Years 1 and 2.

Focal area: *Synthesis of Existing Programs and Projects*

Activity 2: In Year 3 we completed these activities. We secured access to a number of datasets, including multiple rounds of the Nepal Living Standards Survey (NLSS), Nepal 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 Studies (GIMMS) group at NASA's Biospheric Sciences Branch). Working directly with Nepal's Central Bureau of Statistics, we successfully gained access to the most recent round of the NLSS data (2011). We also obtained from the Ministry of Agriculture a large dataset consisting of agricultural market prices observed at monthly intervals in more than 45 Nepalese districts and 4 Indian border markets. These data cover more than 20 important agricultural commodities and constitute approximately 40,000 price observations over the period 1998-2011. In the coming year we will be incorporating these data into our analysis of child growth, assessing the empirical evidence regarding the role of agricultural prices and price variability on nutrition outcomes.

Focal area: *Discrete Socio-Economic Analysis*

Activity 3: Current efforts focus on generating research deliverables from prior investments of time and resources. In Year 3 we made substantial progress on several fronts and have achieved momentum on analysis and writing. In keeping with our goal to develop useful data and make

these data available to other members of the NIL research team, we released an analysis-ready dataset to project partners. We have developed a pipeline of research papers, some of which have been submitted and are now in peer review, and some of which are in working paper form. Two Master of Science theses have been completed and a PhD dissertation is underway. A partnership with a graduate student at Tribhuvan University was successfully completed during Year 3.

Lessons Learned and Challenges in Implementing Proposed Activities

No impediments to progress at this time.

Solutions/Resolutions Applied or to be Applied

N/A

Section II: Capacity-Building Activities

Focal area: Degree Training

Activities: Ganesh Thapa began his PhD training in Agricultural Economics at Purdue University in August 2012, after spending part of the summer of 2012 in Nepal working as a consultant to the project. Mr. Thapa successfully completed his first-year PhD qualifying examination in the summer of 2013 and is currently generating a prospectus document for presentation later this year. Professor Patrick Webb has agreed to serve as an outside committee member for Mr. Thapa. We are working to position Mr. Thapa for successful completion of his PhD and reintegration to the academic and policy research community in Nepal. A second student, Celeste Sununtnasuk, completed her MS degree in Agricultural Economics at Purdue University in May 2013. She worked extensively with Nepal DHS and NLSS data and recently joined IFPRI in Washington, DC. Binod Khanal, a MS student at Tribhuvan University, completed his degree in February 2013. Mr. Khanal undertook fieldwork with the support of a small NIL grant administered by Purdue.

Lessons Learned and Challenges in Implementing Proposed Activities

Identifying well-prepared host-country students for graduate degree training in the US has been a significant challenge. From a logistical point of view, early project delays and the substantial investment in student recruitment, screening and processing has meant that we are likely to train only a single Nepalese student at the PhD level.

Solutions/Resolutions Applied or to be Applied

We have made a commitment to support Mr. Thapa and it is essential that we maintain continuity of funding to support him 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 reported in past annual reports)

Shively, G. and C. Sununtnasuk (2013) "Agricultural Diversity and Child Stunting in Nepal." Currently under review at the *Journal of Development Studies* for a special issue on Agriculture and Nutrition. [Available in working paper format.]

Brown, M., K. Grace, G. Shively, K. Johnson, and M. Carroll (2013) "Using Satellite Remote Sensing and Household Survey Data to Assess Human Health and Nutrition Response to Environmental Change." Currently in review at *Population and Environment*. [Available in working paper format.]

Khanal, B., P. Regmi, G. Shively, G. Thapa, and C. Dhakal (2013) "Roads, market access and poverty: the case of the Chepang community in Nepal." Currently in review at the *Journal of Agricultural Science and Technology*. [Available in working paper format.]

Sununtnasuk, C., G. Shively and M. Brown (2013) "Does Environmental Variability Help to Explain Child Nutrition Outcomes? Evidence from DHS and Satellite Remotely-sensed Data in Nepal." Currently in preparation for submission to *Food and Nutrition Bulletin*. [Available in working paper format.]

Leveraging and Cost Sharing

Substantial leveraging for Year 3 Work Plan activities in Nepal came in the form of NASA support for our collaboration with Dr. Molly Brown at NASA. While it is not possible to put an exact dollar amount on the value of this leveraging, Dr. Brown has devoted substantial amounts of time to our efforts, served as an external committee member for one graduate student at Purdue University, participated in a NIL-sponsored organized panel, and continues to collaborate on data analysis and writing. In our use of remotely-sensed vegetation data, we are creatively leveraging hundreds of millions of dollars in past U.S. government investment in satellite data collection and processing.

Vignettes

We organized a special session at the 2013 annual meeting of the Agricultural and Applied Economics Association in Washington, DC, entitled "Agriculture and Nutrition Linkages." The moderated session included four papers focusing on different aspects of the topic. The first paper, "Impacts of Agriculture on Nutrition: Nature of the Evidence and Research Gaps" (by Patrick Webb and Eileen Kennedy, Tufts University), synthesized the results of 10 reviews conducted since 2000, highlighting their major conclusions and the implications of those conclusions for planned and future research. The second paper, "Agricultural Development and Nutrition: A Dynamic Panel Analysis" (by Jan Dithmer and Awudu Abdulai, University of Kiel), studied a cross-section of countries for the period 1980-2007 to identify key determinants of food and nutrition security, as well as the impact of agricultural development and trade on food security and nutrition. The third paper, "Agriculture and Nutrition in Nepal and Uganda: Evidence from Survey and Remotely-sensed Data" (by Gerald Shively, Purdue University and Molly Brown, NASA), reported new empirical findings linking nationally-representative data on child health and agriculture, incorporating remotely-sensed satellite data to account for growing conditions. The fourth paper, "Using High Resolution Remotely Sensed Data to Re-Examine the Relationship between Agriculture and Fertility in a Pre-Transitional Setting" (by Katherine Grace, University of Utah and Nicholas Nagle, University of Tennessee), extended historical studies of fertility and agriculture to examine the impact of local food production on fertility outcomes in Mali, taking advantage of geo-referenced health data and recently developed analytic strategies from the remote sensing literature. Given the novelty of data and methods employed in these papers, and the wide geographic coverage of the papers, there was high interest and attendance. Will Masters, Tufts University, served as a moderator for the session.

Annual Report

DAI

Year 3 (2012/2013)

Nutrition Innovative Lab - Asia

Principal Investigator: Kathleen Kurz (kathleen_kurz@dai.com)

Team member: Sumi Devkota (Kathmandu-based consultant)

The objective of DAI's Year 3 work under the Nutrition Innovation Lab was to:

- Design and implement, based upon recommendations from last year's market survey of complementary foods, and working through a Nepali strategy organization, a pilot project to build the capacity of a cottage-industry organization in Kathmandu to improve the production of their complementary food product, Sarbottam Pitho.
- Produce training materials from the capacity building exercise.

The work in Year 3 is a no-cost extension from Year 2.

More specifically, we worked in Year 3 with a cottage industry in Kathmandu—Chhimeki, an NGO. Chhimeki had begun producing a processed, fortified complementary food (PFCF), Sarbottam Pitho. Their management is a women's cooperative which sells directly to households through their volunteers. Chhimeki's volunteers provide nutrition education along with sales of the PFCF. Chhimeki produces and sells a PFCF targeting the urban poor in 11 wards who are less able to afford commercially-marketed products and thus are currently not purchasing PFCFs. The fortification is from a micronutrient premix containing iron, folic acid and vitamin A. However, they were producing the product under capacity and the food tasted more like a medicine than a cereal. Under the auspices of the Nutrition Innovation Lab, we wanted to offer Chhimeki some technical assistance.

In November 2012, DAI issued an RFP with a Terms of Reference to provide the following to Chhimeki:

- Conduct an operational audit to improve the production, packaging, and distribution process to reduce unit production costs in the expanded facility. The purpose of the audit was to examine the cost structure of production, marketing, and sales, and also the general capabilities of the volunteer staff to offer nutrition counseling, and effectively market the product.
- Provide initial training to Chhimeki management in business planning and assist them to develop a business plan for expanded operations. The business plan was to establish a strategy for product improvement, pricing, marketing, and sales. Based on the audit above, technical support to Chhimeki management would assist them to determine the feasibility of adding a marketing and sales staff person to guide the volunteers and to expand beyond the areas covered by volunteers. The business plan would also address basic and essential production practices to ensure product quality and hygiene.
- Begin to conduct taste tests of the existing and alternate formulations and processing methods. Variations were to include ingredient proportions, additional ingredients, grinding and roasting sequence, roasting time, and granularity based on grinding settings.
- Draft training materials based on these tasks.

DAI received three proposals to conduct this work, and chose Right Direction Nepal of Kathmandu based on the scoring criteria laid out in the RFP. They did a fantastic job, providing excellent technical support to Chhimeki, communicating and sharing drafts with DAI and our consultant in Kathmandu. They worked so closely in many aspects of the business of producing Sarbottam Pitho, including and going beyond conducting operational audit, business plan, and taste testing, that they exceeded expectations.

The outputs are attached:

1. "Cottage Industry Production of Fortified Complementary Foods in Kathmandu, Nepal: Business Technical Assistance for Management, Planning, Operational Audit, Taste Testing, and Formulation"
(Corresponds to the first three bullet points above)
2. "Training Module: Producing a Complementary Food Product"

(Written in generic training language, we hope this will be of use to other Nutrition Innovation Lab partners)

And in addition to the requirements, a report on their two-day training with Chhimeki in June 2013:

3. "Support to the DAI Nutrition CRSP Capacity-Building for Complementary Foods Activity: Training Report"

A key finding was that the NGO Chhimeki and the affiliated for-profit organization, Chhimeki Multipurpose Cooperative Industry (CMCI), were not properly set up as a business, mixing models of grant funding that covered staff salaries, and profits from sales. RDN trained and mentored extensively on management, accounting, business planning in the hopes that CMCI could sustain their production of a new and improved Sarbottam Pitho beyond the life of their current grants. Our conclusions and recommendations at the end of the first output address this issue.