



# **Action Against Malnutrition through Agriculture**

Nepal Child Survival Project

Kailali and Baitadi Districts, Far Western Region

Bajura Expansion District

## **Final Evaluation Report**

Child Survival Health Grants Program –Innovation Category

Helen Keller International – Nepal

in collaboration with the Nepali Technical Assistance Group

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## **List of Abbreviations, Acronyms and Special Terms**

AAMA	Action Against Malnutrition through Agriculture Project (AAMA = “Mother” in Nepali)
ARI	Acute Respiratory Infection
BCC	Behavior Change Communication
BMI	Body Mass Index
CATCH	Core Assessment Tool on Child Health
CHD	Child Health Division
DADO	District Agricultural Development Office
DEO	District Education Office
DHO	District Health Office
DIP	Detailed Implementation Plan
ENA	Essential Nutrition Actions
FANTA	Food and Nutrition Technical Assistance project
FAO	Food and Agriculture Organization of the United Nations
FCHV	Female Community Health Volunteer
FWR	Far Western Region
HFP	Homestead Food Production
HFPB	Homestead Food Production Beneficiaries
HH	Household
HKI	Helen Keller International
HQ	Headquarters
IFA	Iron + Folic Acid
IFPRI	International Food Policy Research Institute
IMR	Infant Mortality Rate
KPC	Knowledge Practices and Coverage
M&E	Monitoring & Evaluation
MCH	Maternal Child Health
MI	Micronutrient Initiative
MOH	Ministry of Health and Population
MOU	Memorandum of Understanding
MTOT	Master Training of Trainers
NAC	National Advisory Committee
NDHS	Nepal Demographic and Health Survey
NFHP	Nepal Family Health Program
NNSWA	Nepal National Social Welfare Association (Nepali NGO)
NTAG	Nepali Technical Assistance Group
SD	Standard Deviation
SMJK	Snehi Mahila Jagaron Kendra (Nepali NGO)
SWC	Social Welfare Council
VDC	Village Development Committee or the geographic area served by the committee
VMF	Village Model Farm or Farmer
WAZ	Weight for Age
WHO	World Health Organization
WDF	Women’s Development Forum (NGO)

## A. PRELIMINARY INFORMATION

### Executive Summary

In Nepal, where rates of chronic malnutrition are among the highest in the world, Helen Keller International (HKI) has implemented an innovations category project funded by USAID's Child Survival and Health Grants Program (CSHGP) with additional funding from USAID Nepal. The premise of the innovation was that by addressing the barrier of lack of access to nutrient-rich foods, the Expanded Household Food Production (EHFP) model enables families to put into practice the accompanying recommendations for women and young children to eat a varied diet to achieve optimal nutritional status. The project, called Action Against Malnutrition through Agriculture (AAMA) targeted three districts in Far West Nepal: Kailali, Baitadi and Bajura. The EHFP intervention was the same in all districts, but Baitadi served as the Operations Research (OR) district. The project goal and three results were the same in the OR district and the other districts, with a fourth result related to scaling up for Kailali District.

Project Goal: To reduce child malnutrition and related mortality in the target districts.

Results:

1. To improve the **nutrition and health status** of children under two years and pregnant and lactating women
2. To increase the **accessibility and availability of year round of micronutrient-rich foods** for consumption by children under two years and pregnant and lactating women;
3. To **increase the capacity** of local NGO and district staff, FCHVs and community members to promote improved nutrition and agricultural practices; and
4. To develop an integrated **food security and nutrition intervention** that serves as a district wide model to scale-up (Kailali District only).

The EHFP strategy combines HKI's signature Household Food Production model with promotion of the Essential Nutrition Actions. In each target community, volunteers were selected to serve as Village Model Farmers (VMF), receiving training, inputs, and supportive supervision to start models of vegetable gardening and poultry raising. They formed two groups of approximately 15 women who were either pregnant or had children under two years of age. The group members, called Household Food Production Beneficiaries (HFPBs), received inputs of seeds, seedlings and chickens of improved breeds.

HKI collaborated with national partner Nepali Technical Assistance Group (NTAG) and local partners Nepal National Social Welfare Association (NNSWA - Kailali) and *Snehi Mahila Jagaron Kendra* (SMJK - Baitadi) as well as the government to implement the program. With the additional funding from USAID Nepal, HKI was able to add a governance component which served to bring together various government entities at the national, regional, district and local levels to collaborate on addressing food security and nutrition. This component also empowered local stakeholders to advocate through local governance channels for funding to support AAMA activities or replication of the activities in adjacent wards.

### Key Findings/Results

Nutritional status, specifically chronic malnutrition and anemia among children, improved significantly in Kailali District and among the Dalit (disadvantaged) population in Baitadi where there was a marginally significant reduction in anemia in intervention compared to control children and a significant reduction in both anemia and underweight in women of reproductive age. There was no

change in these indicators for Bajura where exposure to project activities was limited to two years and there are other factors such as extremely poor sanitation that may affect nutritional status.

Across all districts, there was impressive adoption of both HFP practices and improved nutrition and health behaviors. Over two-thirds of families now have proper gardens and have adopted related practices such as planting in rows, using homemade bio-pesticides, and raising a greater variety of vegetables. About twenty percent of families now report year-around garden production, which is an improvement, and overall vegetable production increased. There were significant improvements in dietary diversity and in infant and young child feeding practices such as exclusive breastfeeding, adequate complementary feeding and feeding children Vitamin A-rich plant foods.

Poultry-raising was less successful due to the use of improved breeds which required more care and feed than HFPBs provided. There were very high losses due to predators, accidents and disease. The project did not have an initial plan for vaccinating poultry and was not able to come up with sustainable solutions before the end of the project.

The operations research was implemented as planned. In Baitadi the EHFP intervention was implemented as a community randomized effectiveness trial. Four intervention Ilakas, or sub-regions were been randomly selected and matched with four control Ilakas on economic, health and food security indicators; baseline and end line measures of both arms were compared (double-difference estimates) to allow for probability assessment of the impact of the intervention. While the OR intervention did not achieve all the expected results in improving nutritional status, particularly of children, the results of adoption of HFP practices and improved nutrition and health practices were significantly better in the intervention Ilakas by the end of the project.

Summary tables explaining the results can be found in Annex 17.

## Main Conclusions

1. The AAMA project achieved excellent outcomes in changing ENA and maternal health behaviors and adoption of HFP practices for raising vegetables.
2. These outcome improvements were equally impressive in the OR district where there was a much higher ratio of staff and volunteers per beneficiary as in the scaling-up district where the ratio was lower, particularly during the first half of the project.
3. The project did not achieve expected improvements in anthropometric outcomes for children in Baitadi and Bajura. There are other factors such as very low levels of sanitation and continued high levels of food insecurity which the project did not address that may play a larger role than dietary diversity and IYCF practices in the current high levels of stunting and anemia. The short time frame of project implementation may not have provided sufficient exposure to new practices, including significantly increasing the amount of micronutrient-rich foods consumed.
4. The poultry component of EHFP needs serious strengthening before further replication. Family flocks did not increase significantly and egg consumption remained very low overall. That said, the fact that some strict Brahmin families in Baitadi adopted chicken production and agreed to feed eggs to their children is an accomplishment.

5. The official registration of EHFP groups as agriculture groups with DADO, with the requirement for their becoming a savings group, has greatly enhanced potential for sustainability.
6. The governance component, although limited, was very successful in promoting citizen participation in influencing budget allocations, and in bringing together cross-sectoral working groups to plan, to coordinate, and to influence VDC and District-level funding. The success of the governance component is evident in the official designation of VMFs as Local Resource Persons and in replication of some AAMA activities to many other wards and to marginalized populations.

## Recommendations

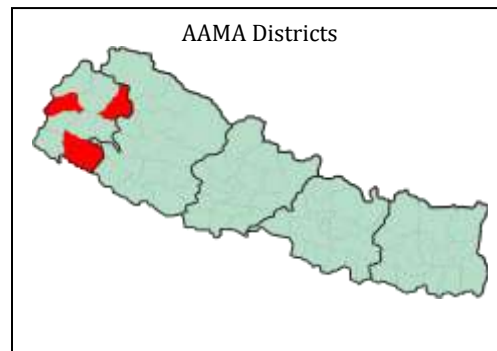
The first sets of recommendations listed here are directed at HKI globally to improve EHFP.

1. HKI needs to assess carefully any major changes in the HFP model. A major determinant in adoption of new agricultural practices is fear of risk. Research shows that farmers are much more likely to adopt a practice they have seen already successful on another farm; therefore, there is value in having one person in the community implementing new practices in advance of the others in order for them to see the results before investing their time and resources.
2. Reassess introducing improved breeds of poultry for Homestead Food Production. There is consensus from poultry experts (FAO, UC Davis) that it is best to focus on teaching people to take better care of existing village poultry. They require less feed and care, and have instincts to survive that have been lost in developing improved breeds, even ones which have been raised in Nepal in confinement for a long time. Five well-cared-for local hens can produce up to 70 eggs each per year, which would be 350 eggs total. Twenty-five of these could be used for reproduction leaving 325 for the family to consume. If all twenty-five chicks hatch and most survive, which is feasible if they are kept penned, some can be sold to cover cost of vaccine and additional feed to supplement what is available from the household.
3. Assure that there is a sustainable system of vaccination against Newcastle Disease before promoting poultry in any context. Village level campaigns on a regular schedule 3-4 times a year are effective.
4. Work with technical staff to develop interactive learning tasks to use with both volunteers and participants for all key messages. Using interactive learning tasks is important not only for agriculture, but also to enhance ENA counseling and discussions.
5. AAMA project staff worked with the evaluation team to prepare a detailed list of technical interventions for Suahaara Project and other projects that are going to be replicating the EFHP model or parts of it in Nepal. These were shared with donors and implementers.
6. Recommendations to USAID regarding OR projects are found at the end of the narrative



## B. Overview of the Project, OR Structure, and Implementation

The **Action Against Malnutrition through Agriculture** project (AAMA, or mother in Nepali), is an innovation to significantly improve nutritional status of pregnant and lactating women and children less than two years of age by addressing a key determinant of malnutrition; that is, increasing household food production in two Far West districts: Kailali District in the lowland Terai and Baitadi District in the hill country. With a grant from USAID Nepal in 2010, the project was extended to a third district Bajura and a governance component was added in all three districts.



Project Goal: To reduce child malnutrition and related mortality in the districts of Kailali and Baitadi of Nepal.

Results:

1. To improve the **nutrition and health status** of children under two years and pregnant and lactating women
2. To increase the **accessibility and availability of year round of micronutrient-rich foods** for consumption by children under two years and pregnant and lactating women;
3. To **increase the capacity** of local NGO and district staff, FCHVs and community members to promote improved nutrition and agricultural practices; and
4. To develop an integrated **food security and nutrition intervention** that serves as a district wide model to scale-up

Helen Keller International (HKI) and its national partner Nepali Technical Assistance Group (NTAG) and local partners Nepal National Social Welfare Association (NNSWA - Kailali) and *Snehi Mahila Jagaron Kendra* (SMJK - Baitadi) have been collaborating on the innovation that merges two proven programs addressing complementary and critical facets of malnutrition in Nepal and throughout the developing world: food security and nutrition knowledge and practices. Addressing the first is HKI's signature Homestead Food Production (HFP) program, which has been bringing appropriate technologies for improved household food availability and diversification for almost 20 years in South Asia and for over 10 years in Nepal. This approach, establishing demonstration village model farms (VMFs) that provide technical support and inputs to affiliated beneficiary households to enable them to set up "developed" home gardens and poultry rising, has demonstrated positive impact on household food production, consumption and micronutrient status, as well as on women's economic and social empowerment<sup>1</sup>. The second element is applying the Essential Nutrition Actions (ENA) framework to improve key nutrition practices at the household level.

The project strategy involved establishing a network to diffuse HFP and ENA in all 42<sup>2</sup> sub-divisions of Kailali District through establishment of VMFs in collaboration with Nepal's highly successful Female Community Health Volunteer (FCHV) program, and with support from the District Health

<sup>1</sup> Helen Keller International Nutrition Bulletins for Nepal (May 2001; July 2004), Bangladesh (Sept 2003; Nov 2004) and Cambodia (May 2004; December 2006).

<sup>2</sup> The approved Detailed Implementation Plan mentions 43 VDCs, but one was re-designated by the government as an urban municipality.

Office (DHO), District Agriculture Development Office (DADO), and District Livestock Office (DLO). Each VMF has two groups called Household Food Production Beneficiaries (HFPB) of about 15-20 women (mothers of children under two or pregnant women) who are expected to share their learning with relatives and neighbors. FCHVs were given the option of being VMFs, if they had enough land, or of joining the HFPB. All affiliated FCHVs received training intended to expand their basic nutrition knowledge around the ENA and, skills for nutrition counseling. The VMFs provide a platform to facilitate their education efforts regarding nutrition, and have enabled them to reach mothers of children under two who are not currently in their traditional mother's groups.

In the Kailali district the project used an adequacy assessment (comparing baseline to end line measures on a spectrum of nutrition, hygiene, food security and food production indicators) to measure project impact. The intent in Kailali was to create a district-wide model that can be replicated elsewhere. While this model was expected to improve food security and nutrition knowledge and practices for the entire population of the district, direct participants in HFP represented slightly less than 10 percent of the population of mothers with children under two years (2009 census estimate). With funds allocated by the government through Village Development Committees, project activities were minimally extended to another 5% of the population. Because the project interventions in Kailali coincided with significant economic growth and increased food security in the region<sup>3</sup>, along with renewed efforts by the Ministry of Health to improve coverage, the final survey shows very good results.

In the Baitadi district the intervention was implemented as a randomized community effectiveness trial. Intervention sites (Ilakas, or sub-regions) were randomly selected and matched with control sites on economic, health and food security indicators. Baseline and end line measures of both arms were compared (double-difference estimates) to allow for probability assessment of the impact of the intervention on child and maternal nutritional status, household nutrition practices and food production. In this model, the project intent was to improve food security and nutrition practices for the entire population of the intervention Ilakas by actively involving approximately 70 percent of the population of mothers of children under two in these areas. The elements of the implementation strategy were the same in both districts but there are double the numbers of VMFs per VDC in Baitadi.

The technical interventions covered included infant and young child feeding (40%), vitamin A-micronutrients (40%), control of diarrheal diseases (10%) and maternal and neonatal care (10%). All of these interventions are covered under ENA. AAMA relies on the FCHVs and VMF to convey ENA messages to the HFPBs who are expected to diffuse the messages to others in the community. FCHVs received limited training (3 hours) in using "negotiation for behavior change" as the counseling method and were provided flipcharts with key messages.

Table A Estimated Target Population (based on 2009 census estimates)

	Children <2	Children <5	Pregnant Women	Total Target Pop.	Total Population
Kailali District	40,257	100,166	20,125	160,528	632,994
Baitadi District*	4,991	11,715	2,455	19,161	78,331
Bajura District**	6,588	18,726	3,297	9885	131,374
Total	51,836	130,607	25,877	189,574	842,699

\*intervention areas only \*\*Added in 2010 with funding from USAID Nepal

<sup>3</sup> WFP Nepal Food Security Bulletin, Issue 35, for May 2012  
<http://documents.wfp.org/stellent/groups/public/documents/ena/wfp248497.pdf>

In 2010, USAID Nepal gave HKI a grant to replicate the model in remote Bajura District, covering parts of all 27 sub-regions (VDCs). This grant of \$728,387 was added to the CSHGP grant and greatly increased the target population and reach of the project. Partnering with a local NGO, Women’s Development Forum (WDF), in Bajura, HKI reached 3412 women and approximately 3500 children under two during the two-year period, working through 135 VMFs. The baseline and endline surveys used cluster sampling and the same instruments used in Kailali and Baitadi. Another goal of the USAID Nepal grant was to improve related governance in all three project districts. This add-on activity enabled HKI to strengthen local government and community capacity and to expand and sustain the project interventions and resulted in replication of some project activities in additional geographic areas of the original two districts, thus, another 2,477 women directly received some inputs and some education on ENA and HFP.

## C. Evaluation Methodology and Limitations

### Quantitative Evaluation

For each district HKI, contracted local firms with experience and good reputations in survey research to conduct the final KPC surveys and analyze the data. Each firm used the same survey tools that were validated prior to the baseline and used for the baseline surveys in each district. The surveys in Kailali and Baitadi and their control areas were conducted at the same time of year as the baseline: March in Kailali and July in Baitadi. This removed possible seasonal impact on food security, agriculture production, and child illness. Because of the short timeframe of the expansion project in Bajura, the baseline and endline surveys had to be conducted in opposite seasons, with the final survey done during the rainy season, which is a limitation in assessing prevalence of illnesses and both quantity and type of vegetables grown.

For the OR district of Baitadi, HKI decided to over-sample for the endline. They had decided to use a cross-sectional sampling framework using the approach of intent to treat, even though the project included only 70% of eligible households.

The following table shows the samples for the surveys as used in the analyses. For both baseline and final, Kailali was matched with another Far West Terai district Bardiya. As will be fully explained in the OR section of this report, the Baitadi intervention areas were matched to control areas (llakas) in the same district.

Table B Sample Sizes

Survey	Kailali	Control Bardiya	Baitadi Intervention	Baitadi Control llakas	Bajura
Baseline	497	466	1055	1051	450
Endline	696	540	1307*	1307	450

\*890 were actual project participants.

**Limitation:** The organization that conducted the baseline for Kailali and Baitadi was no longer available. HKI contracted different research firms to conduct the final evaluation and provided them training, but the change in research firms and software may have led to some issues in comparability of the baseline and final results. To address this, the firm working with Kailali data re-calculated all the baseline data. This, however, would not compensate for possible differences in data collection by endline enumerators compared to the work done by baseline enumerators. We

have found in the endline, for example, that the food security question was asked based on the past month, rather than on the past year as in the baseline.

Since HKI developed separate M&E tables and presented separate KPC reports for each district in the DIP, the tables and KPC results have been kept separate in this final evaluation report. The detailed Final KPC reports for each district are being submitted as separate documents.

## Qualitative Evaluation

The qualitative evaluation was conducted exactly two years after the mid-term qualitative evaluation in the month of September. Using a participatory approach led by an external consultant, AAMA staff (both HKI and NGO partners) conducted field visits over six days in Baitadi and Kailali, dividing into two teams. The teams used interview guides, which were pre-tested in Kailali communities. In each district, the teams visited ten communities selected as being very good, average, or poor in terms of VMF and HFPB capacity. Annex 10 lists those interviewed, which included district officials, VDC staff, participating women, and VMFs. Using an observation guide, the evaluation team members documented current status of gardens and poultry. Each evening, the teams compiled and synthesized the qualitative findings. When field work was completed, the two teams met to examine findings as strengths or weaknesses and to articulate conclusions and recommendations. Staff from the Suaahara project participated in this process. Details of the evaluation process are listed in the following annexes:

Annex 8 – Evaluation Team Members

Annex 9 – Evaluation Scope of Work with description of information collection methods

Annex 10 – List of persons interviewed during the final evaluation, names of places visited.

**Limitation:** Due to landslides, Bajura District was not accessible. The evaluation team did not have an opportunity to witness first-hand the results of the intensive effort in the two-year intervention nor see how lessons learned from the MTE were applied to Bajura implementation. The team leader did discuss Bajura implementation with the HKI staff involved.

## D. Data Quality and Use

At the time of the baseline survey and the MTE, no problems were detected with the quality of the baseline data. One indicator was separated at the time of the MTE to more accurately measure desired behaviors related to feeding during and after illness: % of children fed the same during or after illness, and % of children fed more during or after illness.

HKI has done an exceptional job of collecting useful monitoring data and documenting the project processes, inputs and outputs. This can be seen in Table 1 Summary of Project Accomplishments. From this data and documentation, it is possible to clearly associate project efforts with the outcomes as will be further discussed in Section E below.

The same tools were used to collect quantitative data for the baseline and final evaluations, the same methods used for data collection, and the same training given to the enumerators and supervisors. The research firms did use different statistical software packages between baseline and final but there is no evidence that this affected the results of the data analysis, although it did

lead to delays in processing data. HKI regional staff did find it necessary to do more data cleaning before re-analyzing Baitadi data and conducting multi-variate analysis.

For Kailali, the control district of Bardiya, and for Bajura, HKI used Population Proportional Sampling once the 30 clusters (VDCs) had been randomly selected. AAMA project was designed to cover one third of the wards in each VDC in Kailali. Although the 126 wards where the project intervened were presumably selected randomly at the beginning of the project, a disproportionate number of them showed up in the sample for the endline survey (25 out of the 41 wards sampled). HKI could not produce the population data used for PPS nor explain whether the intervention wards selected by the project in 2008 were more populous than other wards. The data collection firm said that when they could not find enough eligible households to survey in a selected cluster (ward), they went to an adjacent ward and most of these turned out to be AAMA target areas. Therefore, the Kailali results appear skewed, even though they were intended to be cross-sectional to assess the impact of the diffusion of the project in the district.

## E. Presentation of Project Results

HKI developed separate M&E matrices for the OR district and the others from the beginning of the project. The up-dated matrices are in Annex 6.

## F. Discussion of the Progress towards Achievement of Results

Overall, the AAMA project was implemented as designed with some improvements after the MTE including hiring more staff for the bigger district, and adding the governance component to enable replication and enhance potential sustainability of certain elements. The NGO partners were very dedicated, although there was some high turnover of staff in Kailali at the beginning of the project. There was almost no desertion of the volunteer VMFs, which may be because the inputs they received served as good incentives. The initial participants in the AAMA groups were exposed to all the learning opportunities before attendance started to wane. At that point, HKI staff created new, attractive activities to re-engage the participants, such as cooking demonstrations. Looking at monitoring data, it can be seen that most AAMA beneficiaries received at least 26 months of exposure, meeting twice a month.

### 1. Contribution towards Project and OR Objectives

*Result 1. To improve the **nutrition and health status** of children under two years and pregnant and lactating women*

AAMA did not achieve changes in child nutritional or health status in the OR district according to the cross-sectional survey data. There was a modest change in the overall mean z-score for stunting among the intervention population as compared to the baseline, but there was no statistical change in the percentage of children in the intervention area with height for age below - 2z and no change in the other anthropometric indicators. There were higher rates stunting among children in the control area when compared the intervention area at both baseline and final.

**Table C: Child Anthropometry<sup>1</sup> for Baitadi District**

	Baseline			Endline		
	Total	Intervention	Control	Total	Intervention	Control
<i>n</i>	2106	1055	1051	2613	1306	1307
HAZ <sup>2</sup>	-2.31 ± 1.14	-2.23 ± 1.14	-2.40 ± 1.14*	-2.21 ± 1.28#	-2.10 ± 1.28#	-2.33 ± 1.26*
<-2 to ≥ -3, %	35.6	34.2	37.0	34.6	33.4	35.7
<-3, %	26.2	23.5	28.8*	24.8	21.7	27.8*
Total (<-2), %	61.7	57.7	65.8*	59.3	55.1	63.5*
WAZ	-1.92 ± 0.97	-1.87 ± 0.99	-1.97 ± 0.94*	-1.77 ± 1.02#	-1.77 ± 1.00#	-1.77 ± 1.04#
<-2 to ≥ -3, %	32.8	31.0	34.6	29.7#	30.6	28.8#
<-3, %	12.9	12.4	13.4	11.1	10.4	11.8
Total (<-2), %	45.7	43.4	48.0*	40.8#	41.0	40.6#
WHZ <sup>3</sup>	-0.92 ± 0.91	-0.91 ± 0.93	-0.93 ± 0.89	-0.78 ± 1.03#	-0.85 ± 0.98	-0.71 ± 1.08*#
<-2 to ≥ -3, %	8.6	8.7	8.4	8.2	8.7	7.8
<-3, %	1.8	1.9	1.7	1.9	1.8	1.9
Total (<-2), %	10.4	10.6	10.1	10.1	10.5	9.7

<sup>1</sup>Values are mean ± SD or percent; <sup>2</sup>n=2098 at baseline and 2596 at endline <sup>3</sup>n=2102 at baseline and 2603 at endline

\*Different from corresponding treatment group, *P* < 0.05; #Different from baseline value *P* < 0.05.

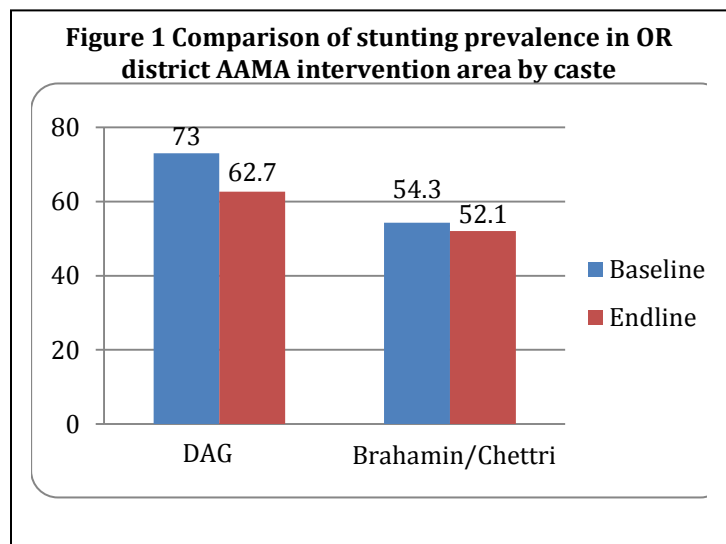
HAZ: height for age z-score; WAZ: weight for age z-score; WHZ: weight for height z-score

As explained previously, HKI used cross-sectional sampling in the target areas as well as in the control areas at endline. Approximately eighty-six percent of respondents of the total sample in the OR intervention areas reported participating in AAMA. Notably, there was much greater impact on stunting in the intervention area among disadvantaged groups (DAG). The AAMA project made a concerted effort to include DAG, creating strategies for the VMFs to feasibly work with those of different castes. After the MTE in Kailali, the governance activities facilitated inclusion of more DAG in AAMA activities as will be described in the later in this document.

In Kailali District, there was a significant decrease in stunting from 28.9% to 18.4%. In Kailali, anemia prevalence among children decreased significantly from 57.7% to 48.8%. Anemia prevalence among women in Kailali did not change although 87.7% reported taking the full 180 day course of iron supplements during their most recent pregnancy, up from 43.8% at baseline.

In Baitadi, the prevalence of anemia among children, did not change in the intervention (treatment) group and increased in the control area as shown in Table D below.

Total anemia prevalence among the women in the intervention group was significantly reduced with an adjusted odds ratio of 0.59 (0.45 – 0.76); *p*<0.05.





**Table D: Child hemoglobin concentration and anemia<sup>1</sup>**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
N	2105	1055	1050	2614	1307	1307
Hemoglobin g/dL	11.8 ± 1.2	11.9 ± 1.2	11.8 ± 1.3	11.7 ± 1.2 <sup>#</sup>	11.8 ± 1.2	11.5 ± 1.3* <sup>#</sup>
Anemia, <sup>2</sup> %						
Mild and moderate	<b>29.6</b>	<b>27.8</b>	<b>31.4</b>	<b>36.5<sup>#</sup></b>	<b>30.6</b>	<b>42.5*<sup>#</sup></b>
Severe	<b>0.3</b>	<b>0.4</b>	<b>0.2</b>	<b>0.1</b>	<b>0.2</b>	<b>0.1</b>
Total	<b>29.9</b>	<b>28.2</b>	<b>31.6</b>	<b>36.6<sup>#</sup></b>	<b>30.8</b>	<b>42.5*<sup>#</sup></b>

**Difference in differences in any anemia adjusted for potential confounders: 0.77 (0.60 – 1.00)<sup>#</sup>**

<sup>1</sup>Values are mean ± SD or percent

<sup>2</sup>Anemia was defined as: hemoglobin < 11.0 g/dL, with mild and moderate defined as hemoglobin < 11.0 to ≥ 7.0 g/dL and severe as hemoglobin < 7.0 g/dL **and adjusted for altitude**

\*Different from corresponding treatment group, *P* < 0.05; <sup>#</sup>Different from baseline value *P* < 0.05.

While Body Mass Index was not a specific OR indicator, it is a measure of improvement of in women's nutritional status. Adjusted logistic regression analysis revealed a significant reduction in underweight: the odds of underweight in intervention compared to control communities was 0.63 (0.47 – 0.84); *p* < 0.05.

As can be seen summarized in Table E below, there were many very positive changes (all statistically significant) in the Essential Nutrition Actions related to Infant and Young Child Feeding. These reflect the effectiveness of the ENA sessions conducted by the VMFs and FCHVs who were trained by the project and the fact that they were conducting these sessions in small groups with repetition of messages in different ways. The group setting provided an opportunity for women to share experiences and support each other to try new behaviors.

**Table E: Changes in Infant and Young Child Feeding Practices in all Districts**

Behavior	Kailali		Baitadi		Bajura	
	Baseline %	Endline %	Baseline %	Endline %	Baseline %	Endline %
Exclusive Breastfeeding	79.1	82.9	<b>62.5</b>	<b>76.7</b>	73.7	78.3
Immediate Breastfeeding	59.9	79.1	<b>59.2</b>	<b>52.2</b>	41.7	81.1
Dietary Diversity ≥ 4 groups	20.8	78.3	<b>41.5</b>	<b>82.0</b>	35.7	69.1
Adequate Feeding Frequency	52.5 <sup>2</sup>	91.9	<b>83.8</b>	<b>96.4</b>	59.3	84.0
Child ate iron-rich animal food	15.2	25.6	<b>7.3</b>	<b>20.2</b>	10.2	45.2
Child ate Vitamin A-rich animal food	5.2	32.4	<b>78.6</b>	<b>88.3</b>	50.9	76.2
Child ate iron-rich plant food	32.2	43.3	<b>55.5</b>	<b>90.3</b>	44.5	70.4
Child ate Vitamin A- rich plant food	42.6	54.7	<b>63.1</b>	<b>93.0</b>	52.3	14.4 <sup>1</sup>
Increased breastfeeding during illness	37.3	46.8	<b>16.7</b>	<b>74.5</b>	20.9	62.1
Same or more food offered during illness	42.5	40.9	<b>31.8</b>	<b>46.8</b>	42.1	46.8

<sup>1</sup> Seasonality is a factor due to timing of endline only in Bajura. <sup>2</sup> Baseline and endline of children 6-23 months of age for Kailali and Bajura; 12-23 months for Baitadi.

There may be many explanations why the anthropometric indicators for children did not improve significantly in the OR district in spite of the improvements in IYCF practices. Participants in Baitadi were engaged in project activities for slightly more than two years. They planted their first gardens in the spring of 2010 and received their poultry after that. This simply may not have been enough time to show impact of increased access to nutrient-rich foods which was needed in addition to the improvements in feeding behaviors.

The survey results for the OR district show a much higher prevalence of illness during the two weeks prior to the survey for all illnesses at endline: fever, respiratory and diarrhea, all statistically significant. Baseline was 15.1% prevalence of any illness, and the prevalence at endline was 31.2%. Bi-variate analysis showed no direct association of anthropometric status and illness. There is recent research<sup>4</sup> showing an association between environmental enteropathy of the gut and chronic malnutrition. This is comes from children being exposed to poor sanitation and hygiene and is hypothesized to be another link between poor sanitation and stunting beyond diarrhea prevalence.

Hygiene and sanitation remain very serious issues in the target areas. In Kailali, 77% of families have a latrine or toilet. Only 18% of families disposed of children's feces in the toilet or latrine. While Kailali families reported using soap to wash their hands, only 6.5% reported washing hands at all four key occasions, up from less than 1% at baseline. In Baitadi OR areas, the percentage of families having a latrine increased from 42.5% at baseline to just over 50% in the endline (unrelated to AAMA). Only 7.2% of mothers reported disposing of the child's feces in the toilet. Nearly half of women in Baitadi OR areas have to leave their yard to wash their hands, although there was a great increase in the number who have soap at the place where they wash hands. (Baseline: 29%, Endline: 80%). Nevertheless, only 11% of the women in the OR areas reported washing their hands at all four key times.

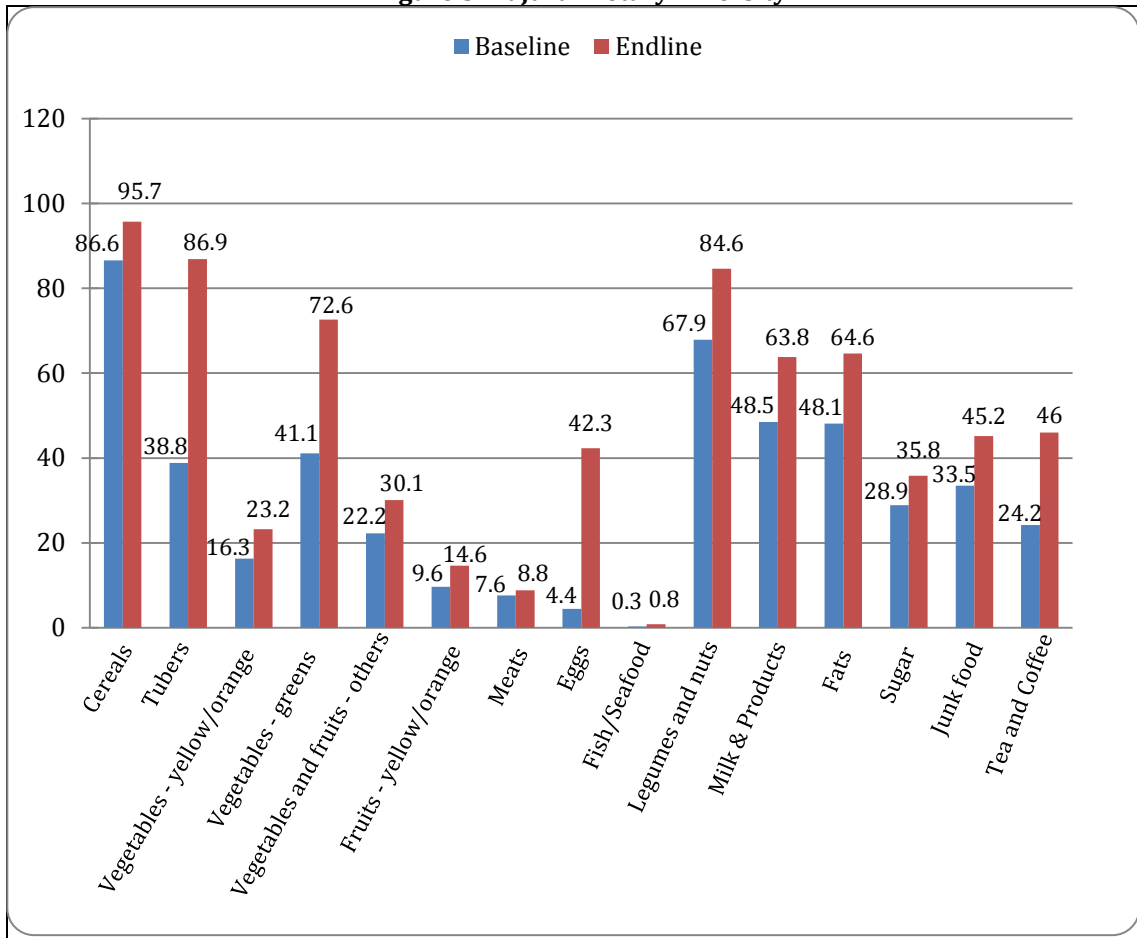
There were improvements in dietary diversity as a result of the ENA messages including the demonstrations on making enriched weaning food. Although direct attribution is difficult without further analysis, the increased home food production may have also played an important role in increasing dietary diversity.

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<sup>4</sup> Humphrey, J.H. Child undernutrition, tropical enteropathy, toilets, and handwashing. *Lancet*, **2009**; 374: 1032-35

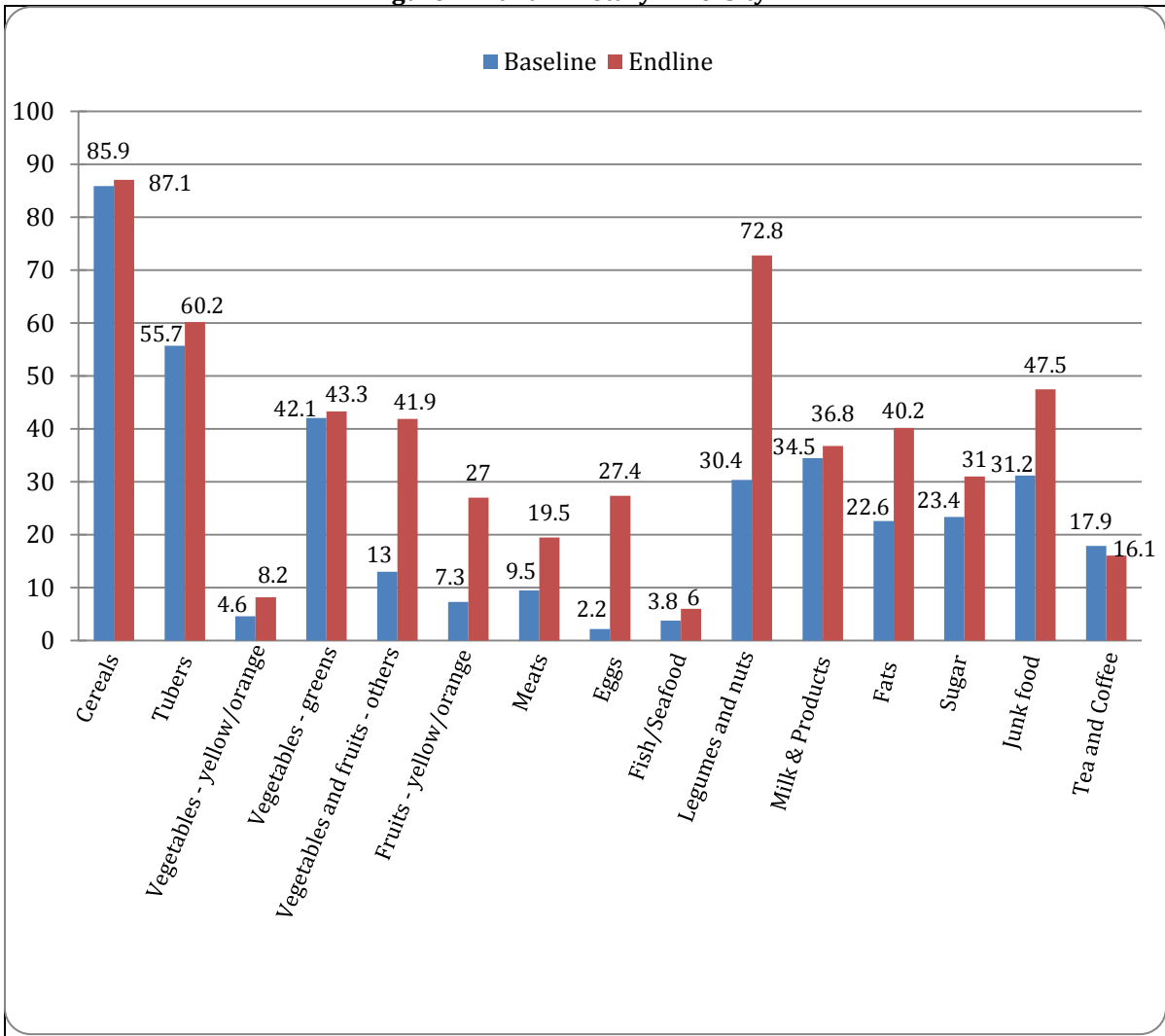


**Figure 3: Bajura Dietary Diversity**

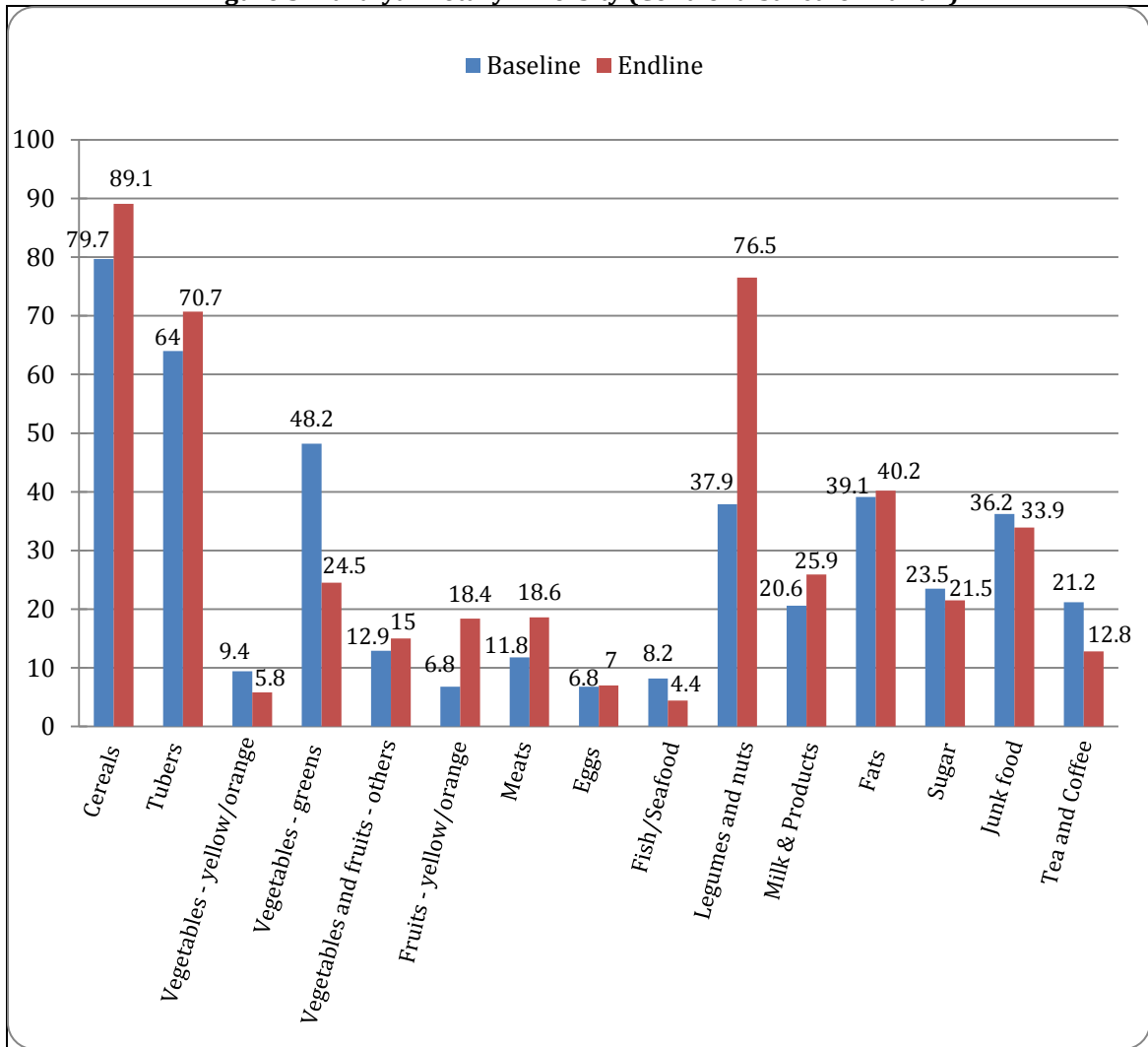


The improvements in dietary diversity become even more evident when comparing to control districts as seen in the following pairs of graphs.

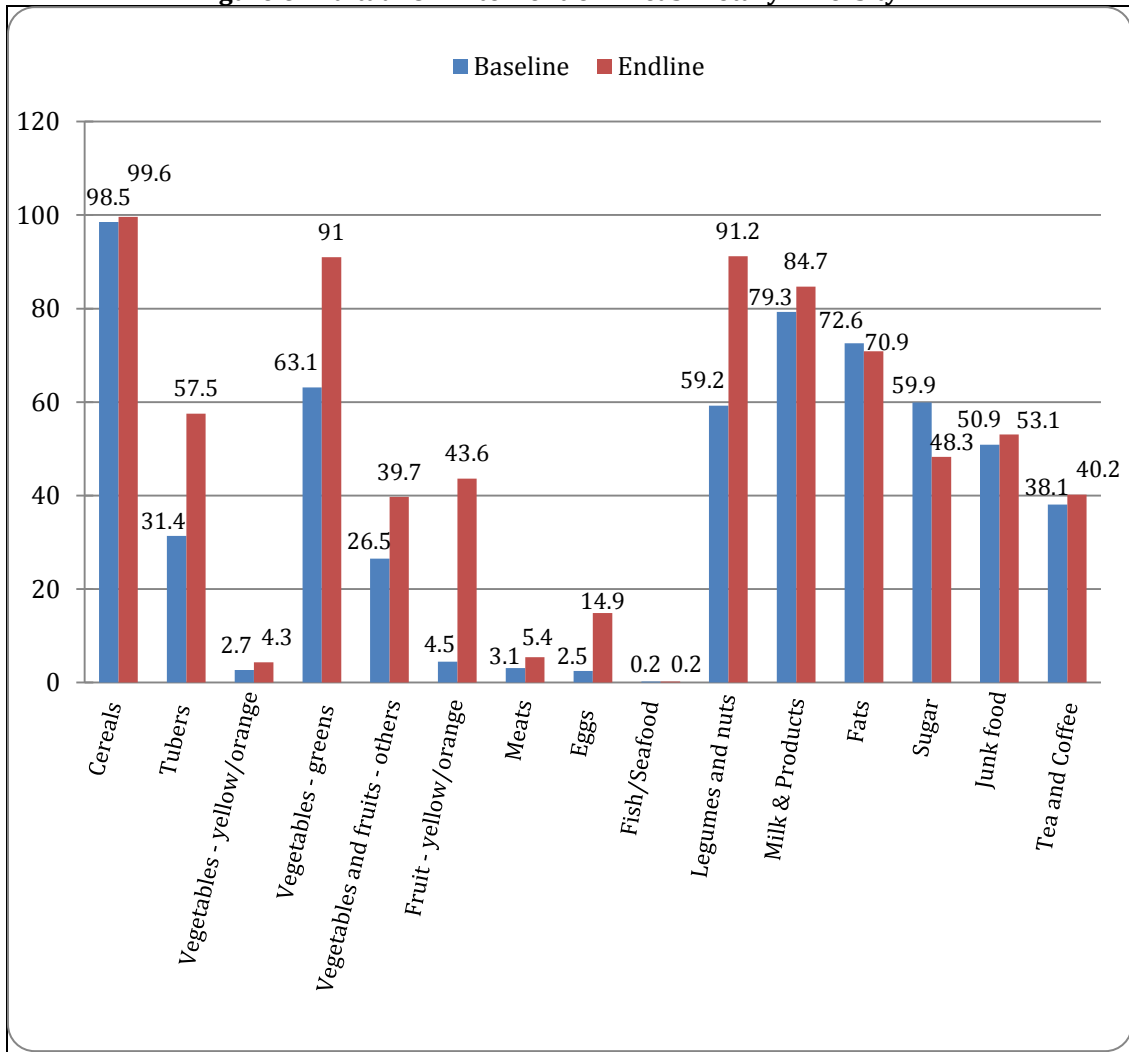
Figure 4: Kailali Dietary Diversity



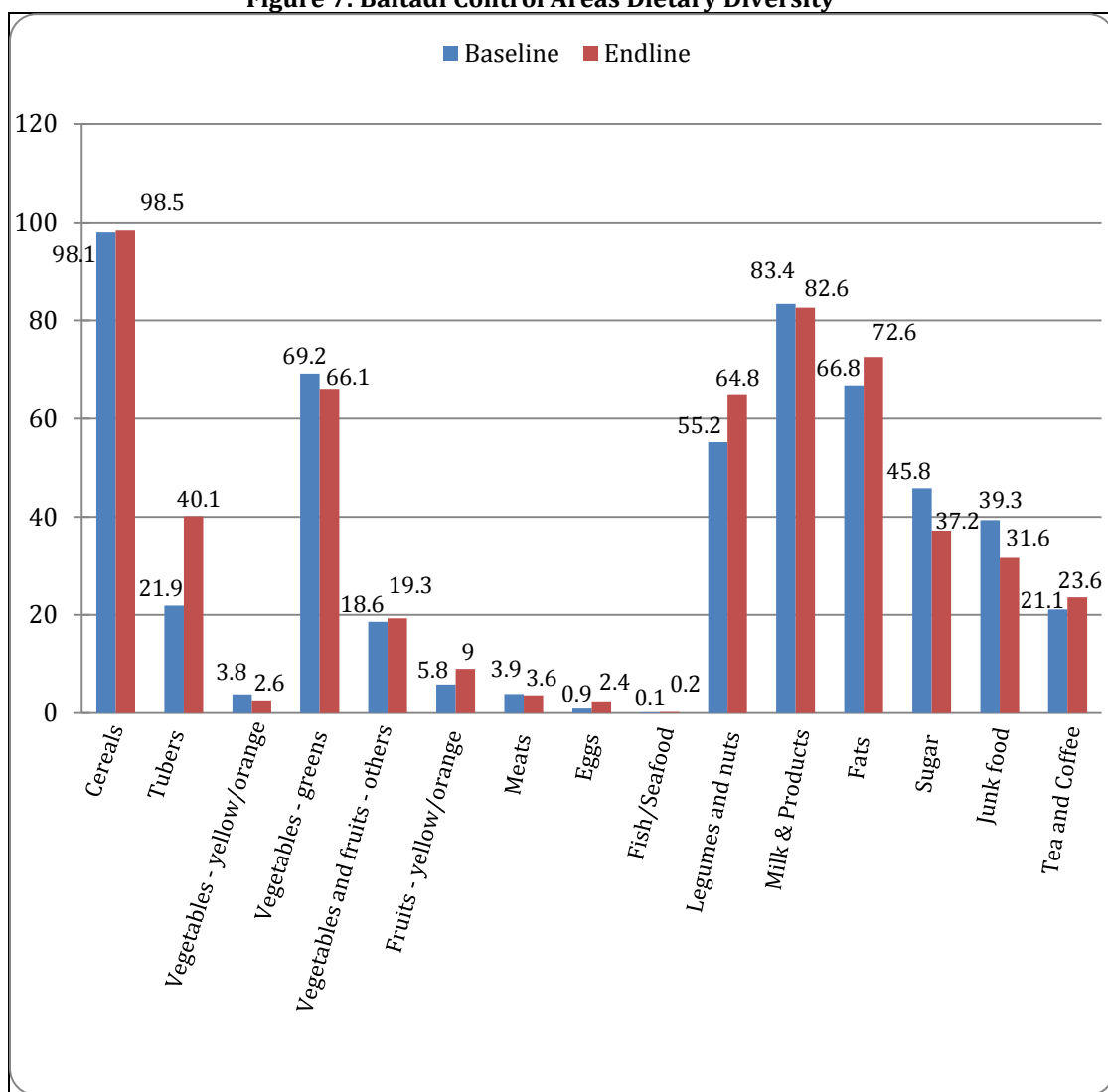
**Figure 5: Bardiya Dietary Diversity (Control district for Kailali)**



**Figure 6 : Baitadi OR Intervention Areas Dietary Diversity**



**Figure 7: Baitadi Control Areas Dietary Diversity**



One caveat in interpreting results for dietary diversity in the endline is that women in the AAMA target areas have gotten the messages on dietary diversity and which foods they are supposed to be feeding their children or eating more of themselves during pregnancy. Therefore, when asked what they fed their child the previous day, they may have given the “expected” answer rather than what they actually gave their child. Another concern with dietary diversity is the lack of quantification – we do not know how much of any particular mentioned food was actually eaten.

*Result 2. To increase the **accessibility and availability of year round of micronutrient-rich foods** for consumption by children under two years and pregnant and lactating women*

Increasing access and availability of micronutrient-rich foods throughout the year would remove the biggest barrier that families in the target areas face in increasing nutrient intake of women and children. AAMA had two components within their Homestead Food Production approach: home

gardens and poultry-raising. There is evidence from the baseline and final surveys of success in the vegetable garden component as summarized in the table here.

**Table F : Up-take of Home Gardening in All Districts**

HFP practices for home gardens	Kailali		Baitadi Intervention Area		Bajura	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
% of HH having a kitchen garden	69.6	89.5	<b>44.8</b>	<b>97.6</b>	40.7	72.7
% having Improved/Developed Gardens	11.5	59.7	<b>1.3</b>	<b>60</b>	8.2	34.4
Vegetable production in last 2 mos. (kg)	45.4	156.9 <sup>1</sup>	<b>10</b>	<b>30</b>	19.4	22.3
Mean number of vegetable varieties	2	5.78	<b>4.0</b>	<b>8.0</b>	2.41	6.36
Produced or planted year around	-	36.4	-	<b>28.1</b>	-	31.8
Use of domestic pesticide	6.2	25.7	3.3	57	3.8	56.1

<sup>1</sup> Total is likely affected by weight of pumpkin harvest.

Besides basic gardening skills of plotting, use of compost and home-made organic pesticides, AAMA introduced technologies such as row covers in Baitadi and raised beds in Kailali to extend the growing season. It was, perhaps, a bit ambitious to strive for year around vegetable production for everyone, considering the frost in high altitudes and monsoonal flooding in the lowlands, but project efforts have definitely extended the growing season in both environments.

The final evaluation team found that there were still issues with site selection in Kailali with some gardens or fruit trees planted in the shade or in low-lying spots prone to water-logging. On the other hand, AAMA had started to create stronger links with agriculture extension and private companies to enable beneficiaries to access seed, including varieties suitable for marketing. There had been less attention given to promoting vegetables that are the better sources of beta carotene, particularly pumpkins and carrots. For example, in Baitadi which has a very suitable climate and soil for both during the frost free months from May through September, the endline survey showed that, on average out of the 8 varieties grown throughout the year, families were growing only one dark yellow/orange vegetable but were growing about 4 green leafy vegetables and the other 4 varieties were vegetables of low vitamin A value.

Overall, the data from the dietary diversity tables above shows that vegetable consumption in the target areas has definitely increased. Another question in the survey asked mothers whether they are feeding their child either purchased or home-grown vegetables daily and this practice increased from 30 to 53% in Baitadi intervention zone.

During the final evaluation, women interviewed with specific questions, reiterated that the single most important facilitating factor to feeding their child eggs frequently was having their own hens to lay eggs. Under the HFP strategy, each AAMA beneficiary was given five chickens of improved breeds and some instruction on how to care for them. The VMFs were given 20 chickens, including roosters, with the intent that they could reproduce chicks to sell to others. Unfortunately, this strategy was not very successful. Losses of chickens were very high because, in most households, the improved breeds were not kept confined in coops with pens. They died in accidents, were killed by predators including dogs and cats, and were killed by neighbors when found in their crops.

The Government of Nepal does not have a vaccination program for poultry, although they recommend seven vaccinations to cover three different diseases: Newcastle, Marek's Disease and Fowl Pox. The latter immunizations are particularly costly and more related to egg production than

to poultry death. The single biggest killer of poultry in Nepal and elsewhere is Newcastle Disease. AAMA did not start out with a strategy for poultry vaccination since they were giving out poultry that had already received the seven vaccines. The offspring of these chickens, however, needed vaccination from Newcastle to survive, particularly since this disease is endemic in local poultry.

This was brought to the attention of AAMA staff at the time of the MTE and some effort was then made to provide vaccine to some communities, either through coordination with DLSO or by teaching some VMFs to purchase vaccine and vaccinate chicks. The latter was complicated by the vaccine being sold in vials of 200 doses. HFPBs were largely still unaware of the importance of vaccination at the time of the final evaluation and reported many chickens, both local and improved, lost to disease. As shown in the chart below, vaccination coverage for poultry was essentially nil.

At the end of the project, very few beneficiaries had any chickens of the improved breeds left although some few had a generation of chickens from crossing local chickens with the improved breeds. Over all, there was no statistically significant increase in the mean number of chickens owned by the households. There was, however, a statistically significant increase in the numbers of households owning poultry, but having 3 or 4 laying hens will result in only two or three eggs per day for about nine months out of the year. (All hens go into “moult”, a period of about 2 to 3 months each year during which they do not lay. Even healthy, well-fed improved breeds lay and egg two days out of three.<sup>5</sup> Production will decrease 20% each subsequent year the hen survives.)

**Table G: Poultry Production Data**

	Kailali		Baitadi		Bajura	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
% of households with any chickens	60.9	77.4	10.8	29.1	24	66.2
Mean number of chickens in household	9.2	9.8	4.40	4.36	2.37	3.37
No vaccination of chickens	97.8	97.3	98.4	98.2	95.4	96.6
Wife spends money earned from poultry	37.0	50.9	32.4	59.3	31.3	64.9

On a positive note, among those families who have chickens now, the final survey found that the women raising the chickens were in control of spending any income earned, more so than at baseline. This may be because the new chickens were perceived as hers instead of belonging to the extended household where most income is shared. The women reported spending this money for household items rather than for micronutrient-rich food, but that included spending for soap and school supplies among a wide range of other utilitarian needs.

Some families reported feeding their children eggs, which is a cultural shift. Particularly, among Brahmin families, eating eggs or feeding them to children was taboo prior to the project intervention, and they did not raise chickens, but, as reported in the MTE learning briefs, some progress was made in getting them to adopt raising chickens and feeding eggs to their child. Note that the question on which the following table was based, did not ask how often the child had been fed an egg. The large majority of families were still not feeding eggs to their children, a behavior which may have directly affected the lack of improvement in nutritional status.

<sup>5</sup> [http://www.albc-usa.org/documents/ALBCchicken\\_assessment-2.pdf](http://www.albc-usa.org/documents/ALBCchicken_assessment-2.pdf)

**Table H: Fed egg to child age 6-23 months (12-23 months in Baitadi) in last 2 months**

	Kailali		Baitadi		Bajura	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Yes	7.6	36	5.5	21.3	5.8	61.7
No	92.4	64	94.5	78.7	94.2	38.3

*Result 3. To **increase the capacity** of local NGO and district staff, FCHVs and community members to promote improved nutrition and agricultural practices*

Across all districts, this result has been achieved. The Training chart in Annex 7 shows the numbers of NGO and district government staff, FCHVs and community members (VMFs) trained. Evidence from the quantitative surveys, as shown in Table 2, and from qualitative questions used to triangulate these findings, testify that those trained have the capacity to effectively transmit learning to the target population.

*Result 4. To develop an integrated **food security and nutrition intervention** that serves as a district wide model to scale-up*

Kailali, the district chosen for the scale-up model, is one of the most populous and one of the largest geographically in all of Nepal. The original model, based on the concept of diffusion, was perhaps unrealistic in this setting. HKI's design of 3 VMFs per VDC with their groups of approximately 40 women, was reaching only 10% of the population at mid-term. After the MTE, HKI used the USAID Nepal funding for adding a governance component, to work with the District Development Committee and the Village Development Committees to raise awareness about the issue of malnutrition among children and women and to promote the formation of Food and Nutrition Security Committees, to whom the EHFP model was presented. As a result, the VDCs funded replication of some AAMA activities, but not the entire EHFP package, in wards that were not originally targeted. This increased coverage to another five percent of the population. Fifty more women's groups were formed as a result of the VDC-funded replication, a very positive outcome.

The original design for Kailali called for HFPBs to share their learning with friends and relatives as a means of further diffusion. At the time of the MTE, this was not yet happening. During the final evaluation, HFPBs and VMFs reported that sharing had become much easier, that neighbors were coming around asking what they learned from AAMA and, that there was widespread adoption of certain practices such as preparation of enhanced weaning food (*jaulo*). The project monitoring system, understandably, had no way to capture this diffusion. The endline cross-sectional survey should have captured some of the diffusion, but this is now uncertain due to the apparent, unintentional, skewed sampling of direct project participants.

## 2. Contextual Factors

Food security is a logical consideration in assessing the nutritional outcomes. The baseline and endline surveys included a series of questions designed by FANTA to assess food security status of the household. According to the survey analysis, perceived food insecurity increased in Kailali from 38.8 to 61.2 percent of households within the past 12 months. However, we saw earlier that stunting significantly decreased in Kailali in spite of this. In Bajura, a district noted for food insecurity, 85.8% of households said they experienced some food insecurity in the year prior to the endline survey. Unfortunately, for Baitadi, the endline question was not asked the same way as the



baseline. However, comparing the endline data between intervention and control areas suggests the program did have an impact on food insecurity.

The endline survey results also show major improvements in the utilization and delivery of health services that are unrelated to AAMA since there were improvements across the control districts, as well. While AAMA may take some credit for promoting utilization, the following chart shows some of the positive changes attributable to the Government of Nepal because access improved in the control areas, as well.

**Table I: Improvements in Access to and Utilization of Health Services**

	Kailali		Bardiya (control)		Baitadi Intervention		Baitadi Control	
	Baseline	Endline	Baseline	Endline	Baseline	Endline	Baseline	Endline
Attended growth monitoring	49.6	74.1	22.1	47.8	50.6	74.5	33.3	51.4
DPT 3 doses	79.5	97.8	81.7	97.9	79.7	98.6	73.0	98.6
De-worming last six months	65.4	78.6	90.4	73.3	85.5	94.8	90.6	92.8
Measles immunization	88.3	95.9	88.1	97.1	90.0	98.3	90.5	98.3

### ***Unexpected Results***

AAMA did not have a maternal-newborn care (MNC) intervention other than promoting the nutrition practices related to MNC; nevertheless, the final survey analysis found improvements in Baitadi with statistically significant changes ( $P < 0.05$ ) in the intervention areas compared to the control areas.

**Table J: Improvements in Maternal Newborn Care Attributable to AAMA**

Maternal practices	Baitadi Intervention		Baitadi Control		DID (unadjusted)
	Baseline	Endline	Baseline	Endline	
Received any antenatal care	70.0	93.0	70.2	85.2	NC
≥ 4 antenatal visits	29.3	65.2	20.2	38.8	1.50 (1.14 - 1.98)*
Skilled attendance at delivery	71.8	92.3	81.0	84.2	3.72 (2.69 - 5.15)*

### 3. Role of Key Partners

The following table summarized the planned and actual roles of the key partners.

<b>Partner</b>	<b>Role in Project</b>	<b>Result of collaboration</b>
NTAG	<ul style="list-style-type: none"> <li>- Support and coordination for planning and implementation of ENA/BCC activities in the districts</li> <li>- Technical support and guidance for production of IEC/BCC materials</li> <li>- Training on ENA/BCC at district level</li> <li>- Coordination with DPHO and health facilities</li> <li>- Support and coordination for monitoring to HKI district coordinators and local NGO partners</li> </ul>	<ul style="list-style-type: none"> <li>- NTAG provided training of trainers (TOT) in ENA and BCC for field staff and FCHV/VMF, and trainings to HFPB</li> <li>- Supported pre-testing of all draft community education materials</li> <li>- Trained staff in MTOT and trainers for FCHV/VMF level</li> <li>- Participated HF and DPHO meetings</li> <li>- Participated in all ENA and IYCF monitoring activities</li> <li>- Assisted field supervisors ENA and IYCF counseling</li> <li>- Assisted field supervisors with growth monitoring at field level in coordination with HF</li> <li>- Assisted with the organization of food demonstrations and counseling to mothers</li> </ul>
Local NGOs - NNSWA, SMJK and WDF	<ul style="list-style-type: none"> <li>- Implementation of all AAMA activities in their respective districts</li> <li>- Coordination with district level line agencies</li> <li>- Provision of the human resources required to implement the AAMA activities</li> <li>- Regular follow up of all field activities</li> <li>- Administrative support to HKI district coordinator</li> <li>- Participation in and support to all types of training (HFP, ENA, BCC) at district and community level</li> <li>- Support to monitoring and supervision activities</li> </ul>	<ul style="list-style-type: none"> <li>- Implemented ENA/HFP training, counseling mentoring and monitoring activities with the help of field staff</li> <li>- Participated in regular coordination meetings with line agencies</li> <li>- Made regular joint program monitoring field visits with government officials</li> <li>- Provided support to HKI staff members on administrative and financial operations</li> <li>- Participated and provided logistics support in training and workshops organized by HKI</li> <li>- Participated in and provided field staff support during LQAS and periodic assessments, including the MTE</li> <li>- Field supervisors provided on-site coaching, inter-personal counseling with home visits and growth monitoring /counseling</li> <li>- Field supervisors organized demonstrations for mothers on food preparation for children under 2 years of age during the HFPB group meetings</li> <li>- Field supervisors supported project site visits to national and international visitors</li> </ul>
DPHO	<ul style="list-style-type: none"> <li>- Attend training and meetings</li> <li>- Supervision of FCHVs</li> <li>- Provide technical support on ENA</li> </ul>	<ul style="list-style-type: none"> <li>- Participated and supported in ENA/BCC training</li> <li>- Supervised all training and activities</li> <li>- Provided facilitators for training</li> <li>- Provided training materials</li> <li>- Provided support during growth monitoring</li> <li>- Provided support to VMFs and HFPBs during ENA training at VDC level</li> </ul>

DADO	<ul style="list-style-type: none"> <li>- Attend training and meetings</li> <li>- Supervision of VMFs</li> <li>- Provide technical support on HFP</li> </ul>	<ul style="list-style-type: none"> <li>- Participated in HFP training</li> <li>- Supervised all training activities</li> <li>- Provided facilitators for training the VMFs as local resource persons</li> <li>- Provided training in mushroom cultivation and distributed mushroom seedlings</li> <li>- Coordinated multi-sector input for food security and nutrition</li> <li>- Provided regular technical support through VDC level agro-vets</li> </ul>
DLSO	<ul style="list-style-type: none"> <li>- Attend training and meetings</li> <li>- Supervision of VMFs</li> <li>- Provide technical support for poultry</li> </ul>	<ul style="list-style-type: none"> <li>- Participated in HFP training</li> <li>- Provided pig raising training</li> <li>- Provided technical advice for improved poultry rearing practices during integrated supervision and monitoring visits and during training and field activities</li> <li>- Provided cold chain boxes for poultry vaccination</li> </ul>
DDC	<ul style="list-style-type: none"> <li>- Support DDC level activities</li> <li>- Support program monitoring</li> <li>- Support DDC level activities VDC committee members orientation on their roles and responsibilities</li> </ul>	<ul style="list-style-type: none"> <li>- Conducted coordination meetings on the multi-sectoral approach through the local governance program</li> <li>- Provided facilitators for the Ward Citizen Forum orientation and VDC committee members orientation</li> <li>- Initiated growth monitoring for children under 2 years through VDC staff</li> <li>- Distributed Salter scales for community based growth monitoring services at community level in coordination with HFs. The scales were supplied by UNICEF.</li> <li>- Led joint monitoring and supervision visits three times a year at VDC level to promote AAMA initiated activities</li> <li>- Convened regular meetings at DDC level to explore available resources from various sectors to contribute to AAMA initiated activities</li> </ul>
VDC	<ul style="list-style-type: none"> <li>- Support VDC level activities</li> </ul>	<ul style="list-style-type: none"> <li>- Provided chickens to local families</li> <li>- Partnered with HKI and trained an additional non-HFPB mothers in poultry raising and ENA</li> <li>- Provided improved seed for HFPB and non- HFPBs</li> <li>- Provided refresher ENA to non-VMF and additional FCHVs</li> <li>- Provided nutrition and food security training to FCHVs by VDC</li> <li>- Provided funds for storing bio-pesticide</li> </ul>

## 4. Overall Design Factors that Influenced Results

Two design issues did affect the project. One, discussed previously, was the selection of Kailali as the scaling-up district with the challenge of reaching so many people in such a large geographic area. This affected the level of scale and diffusion achieved but did not affect outcomes among the direct beneficiaries.

The second design issue of distributing improved breeds of chickens instead of focusing on improving care of existing chickens in the villages was compounded by staff error. The project planned to introduce improved breeds of poultry rather than focusing on improving care of existing village chickens. Beneficiaries struggled to feed the donated chickens properly or protect them adequately with resulting high losses. The protection issue was compounded by the fact that staff did not follow the policy of ensuring the family had built a suitable cage before giving them the chickens. As a result, families did not really increase overall numbers of chickens or eggs to the extent envisioned, as was explained above under Result 2.

The two-year time frame for Bajura did limit exposure to the learning sessions and also the time available to VMFs and beneficiaries to repeatedly practice new skills such as gardening. Most participants only got to plant one year and received their poultry just months before the endline. This lack of exposure does not show up in the outcome indicators, but may affect how well participants sustain the new behaviors and practices. The local implementing partner is strong and may continue to provide some follow-up support to the VMFs.

### a. Contribution to Global Learning

#### Policy Dialogue for Nutrition-Sensitive Development

HKI helped catalyze a process for bringing together government officials from multiple sectors to develop plans for integrating nutrition objectives into activities both within and beyond the health sector. While this effort was reinforced by the additional support provided by USAID/Nepal, it was the CSHGP funding that initially demonstrated the great promise of this approach. The process began with the establishment of the National Nutrition & Food Security Committee as a forum for dialogue about policy solutions to the persistent high prevalence of undernutrition. These discussions were led by the National Planning Commission (NPC) and included representatives from the ministries of health, agriculture and livestock, local development, and education and aimed to define where and how the different sectors could coordinate to achieve the targets of the National Health Strategic Plan and support the recommendations of the Nutrition Assessment and Gap Analysis. These meetings were followed by a series of workshops to strengthen intersectoral planning at the national as well as regional and district levels. HKI's EHFP approach (local, small scale plant and animal-source food production combined with greater awareness of nutritional content and its value to human health and development) was the starting point for the dialogue on nutrition-friendly programs. The national government has clearly embraced these approaches.

Similar joint planning structures were established at district and village development committee (VDC) levels and stimulated enthusiastic discussions of what each department could contribute to advancing and sustaining AAMA activities. The visible outcomes of the model locally inspired local government bodies to commit funding and staff to replicating the approach as well as to assume responsibility for sustaining the investments. (See the Learning Brief on Governance in the annexes.) More details are presented in HKI's Food Security and Nutrition Bulletin No. 5.

## Addressing Equity

Following observations that disadvantaged community members perceive or experience barriers to participation in the program, HKI developed adapted approaches for these groups. In some instances the project supported groups that were comprised only of Dalits (VMF and mothers' group members). In the Chaumala VDC in Kailali, HKI provided technical assistance and supervision to a group of 40 pregnant and breastfeeding mothers and women with children under two who were all from the marginalized group of former bonded laborers (Kamaiya or Tharu) were freed by the government of Nepal some years ago but remaining exceedingly disadvantaged. The women received project inputs of seeds purchased with VDC funds and training to enable them to exploit the 0.25 hectare plots granted to them previously by the government. Supervisors from the VDC, the food security and nutrition steering committee and AAMA visited the groups quarterly to review their progress with vegetable cultivation and poultry production and, as needed, to provide additional technical support. Through the project, the disadvantaged group has learned the process for securing VDC nutrition and food-security funding, helping to ensure project sustainability. See the Learning Briefs for a more detailed description of reaching the former bonded laborers.

## Supervision of volunteers

Lessons for scale up were learned through AAMA to help define the ratio of supervisors needed to follow implementation, support the translation of training into practice, and identify areas needing improvement. HKI now estimates that each supervisor might oversee between 6-10 VMFs depending on geography. Although at start up supervision visits must be more frequent, once routines are established each VMF should be visited once per month by the field supervisors. District coordinators should conduct additional quality control visits to approximately 25 VMFs each month in the terai geography, and 9-10 per month in terrain that is hilly or mountainous. Joint supervisions by government partners should be conducted quarterly so that they remain engaged and informed of the intervention.

Following the mid-term evaluation recommendations, supervision checklists were developed to guide field supervisors in what to look for during visits to VMFs and HH beneficiaries (plotting and raised beds, area of cultivation, number of varieties, poultry coop size and lighting, feed/water, ranging) and questions to explore regarding ENA practices.

For more quantitative monitoring of progress in implementation of program impact pathways (in the case of EHFP, these include quality and completion of training, volume and quality of garden production, quality of animal husbandry, improved maternal, infant and young child nutrition practices, including consumption of garden products) LQAS surveys should be conducted semi-annually, and data analyzed for evidence of implementation weaknesses that need to be resolved. During AAMA, data were collected by PDA, greatly facilitating the immediate use of data for management. Each region should have a dedicated monitoring and evaluation coordinator to oversee the process in the districts and the practical application of findings.

## b. Dissemination and Information Use

Dissemination Activity	Target Audience	Target Date (approximate)
Share findings at district level	District Health and Agriculture office, District Development committee	November 2012
Prepare presentation slide to share findings	National Planning Commission, Ministry of Health and Population, Ministry of Agriculture and Cooperatives, Ministry of Local Development	December 2012
Share key AAMA findings to National Nutrition Group (NNG)	USAID, UNICEF, World Bank, WFP, WHO, EU, ACF, Save, academics,	January 2013
Publish results in peer reviewed journals	Researchers, academics, nutrition policy makers and planners	January 2014

## G. Conclusions and Recommendations

### Conclusions

1. The AAMA project achieved excellent outcomes in changing ENA and maternal health behaviors and adoption of HFP practices for raising vegetables.
2. These outcome improvements were equally impressive in the OR district where there was a much higher ratio of staff and volunteers per beneficiary as in the scaling-up district where the ratio was lower, particularly during the first half of the project.
3. The project did not achieve expected improvements in nutritional status outcomes in all districts. Nutritional status, specifically chronic malnutrition and anemia among children, improved significantly in Kailali District and among the Dalit (disadvantaged) population in Baitadi where there was a significant reduction in both anemia and underweight in women of reproductive age. OR district. There was no change in these indicators for Bajura where exposure to project activities was limited to two years and there are other factors such as extremely poor sanitation that may affect nutritional status.
4. There are other factors such as very low levels of sanitation and continued high levels of food insecurity which the project did not address that may play a larger role than dietary diversity and IYCF practices in the current high levels of stunting and anemia. The short time frame of project implementation may not have provided sufficient exposure to new practices, including significantly increasing the amount of micronutrient-rich foods consumed.
5. The poultry component of EHFP needs serious strengthening before further replication. Family flocks did not increase significantly and egg consumption remained very low overall.

That said, the fact that some strict Brahmin families in Baitadi adopted chicken production and agreed to feed eggs to their children is an accomplishment.

6. The official registration of EHFP groups as agriculture groups with DADO with the requirement for their becoming a savings group has greatly enhanced potential for sustainability.
7. The governance component, although limited, was very successful in promoting citizen participation in influencing budget allocations, and in bringing together cross-sectoral working groups to plan, to coordinate, and to influence VDC and District-level funding. The success of the governance component is evident in the appointment of VHF's as Local Resource Persons and in replication of some AAMA activities to many other wards and to marginalized populations.

## Recommendations

The first set of recommendations listed here is directed at HKI globally and the second set is specific to Suaahara and other projects in Nepal which may adopt the EHFP model. Finally, there are some recommendations to USAID CSHGP for support to operations research.

### For HKI globally to improve HFP:

1. Repeat the OR study, in Nepal under Suaahara and in another context (Africa) with modifications in the sampling design to capture the impact on those children whose mothers have the maximum exposure to the EHFP activities.
2. HKI needs to assess carefully any major changes in the HFP model. A major determinant in adoption of new agricultural practices is fear of risk. Research shows that farmers are much more likely to adopt a practice they have seen already successful on another farm; therefore, there is value in having one person in the community implementing new practices in advance of the others in order for them to see the results before investing their time and resources.
3. Reassess use of improved breeds of poultry for Homestead Food Production. There is consensus from poultry experts (FAO, UD Davis) that it is best to focus on teaching people to take better care of existing village poultry. They require less feed and care, and have instincts to survive that have been lost in developing improved breeds. Five well-cared-for local hens can produce up to 70 eggs each per year, which would be 350 eggs total. Twenty-five of these could be used for reproduction leaving 325 for the family to consume. If all twenty-five chicks hatch and most survive, which is feasible if they are kept penned, some can be sold to cover cost of vaccine and additional feed to supplement what is available from the household.
4. Assure that there is a sustainable system of vaccination against Newcastle Disease before promoting poultry in any context. Village level campaigns on a regular schedule 3-4 times a year are effective.



5. Work with technical staff to develop interactive learning tasks to use with both volunteers and participants for all key messages. A good resource is the book *Taking Learning to Task* by Jane Vella.
6. Using interactive learning tasks is important not only for agriculture, but also to enhance ENA counseling and discussions.

**For replication projects in Nepal including Suaahara:**

AAMA project staff worked with the evaluation team to prepare a detailed list of technical interventions for Suaahara Project and other projects that are going to be replicating the EFHP model or parts of it in Nepal. The detailed technical recommendations are attached in Annex 16. Some additional recommendations regarding strategy follow here.

1. Start the mothers' groups with the plan that women will "graduate" when their child completes 2 years or, the graduates may continue meeting independent of the volunteer leader, so that she can incorporate newly pregnant women and mothers in the HFPB group.
2. Getting the groups registered with DADO and starting their savings and loan activities is a good step to creating sustainable groups which can continue to share experiences and technical knowledge, accessing information from government agencies and health posts.
3. While HKI's plan under Suaahara for the selection of the volunteer leader after the EHFP group has been formed and has received some training has advantages in relation to equity and eliminating one layer in the initial cascade training, this idea needs to be tested. Will a mother of a child under two have time to devote to lead the group, prepare demonstrations, make home visits, etc? Will the other women be willing to try gardening practices and poultry management without seeing a model already functioning in their community? Will the group members accept training from one of their peers after they are accustomed to receiving training from paid staff?
4. There is a need to bridge the gender gap between the male-dominated agriculture and livestock service centers and the women in the communities if we expect them to access technical support from the service centers on into the future.
5. The role of supervision using well-thought-out checklists in assuring quality of knowledge and skills transfer must be emphasized. The supervisors should be held responsible for behavior change and adoption of new practices.
6. Multi-sectoral collaboration needs to be started from the very beginning to engage government agencies into the project. Appoint a focal person in each government office involved to orient new staff about shared nutrition goals across sectors, relationship of nutrition to development, and the program activities. Enhance linkages between beneficiaries and markets, brooding centers, livestock and agriculture service centers, health facilities, WASH, HFOMC, VDC, DDC, and WCF (ward citizen forum).
7. Initiate governance programs in all VDCs and wards. Use cross visits to motivate VDC officials and community representatives.



## For USAID CSHGP and MCHIP:

1. For the recent round of CSHGP awards, USAID is now requiring a Principle Investigator, one person responsible for the OR. PVOs be encouraged to have from the onset a Plan B if the Principle Investigator leaves. Personnel cannot necessarily be committed to stay with the project to the very end.
2. As part of the OR planning process, grantees may want to create dummy results tables they would like to use in the final report and in dissemination of OR results through other means. This would clarify before the baseline, what variables need to be measured and which types of analysis will be needed for the final results. This will help the principle investigator and research partners plan ahead.
3. CSHGP is now also recommending or requiring collaboration with local institutions on the OR, assuming that such capacity exists in each country. As HKI learned from working with the two local research firms on the final quantitative survey, local capacity was lacking even though these research firms are made up of university faculty in statistics and research methods. How can MCHIP help PVOs learn to assess the capacity of potential local research partners before signing one on during the proposal phase?
4. With the current global focus on nutrition, and particularly the current USAID investments, there is an urgent need for funding to support strengthening measurement of dietary diversity (HDDS tool) to include a practical methodology for measuring quantity of consumption. Also, researchers and academicians involved with using HDDS may want to assess the validity of the tool for use in evaluating changes in practices. Does a respondent's newly-acquired knowledge of healthy eating bias her responses?

## AA. Assessing the Operations Research Study

The overall operations research plan was sound, using an experimental design to measure the impact of the intervention Expanded Household Food Production (EHFP) on the target population.

In Baitadi, the OR district, the intervention was implemented as a community randomized effectiveness trial. Intervention sites (llakas, or sub-regions) were randomly selected and matched with control sites on economic, health and food security indicators. Baseline and end line measures of both arms were compared (double-difference estimates) to allow for probability assessment of the impact of the intervention on child and maternal nutritional status, household nutrition practices and food production. In this model, the project was trying to improve food security and nutrition practices for the entire population of the intervention llakas by actively involving approximately 70 percent of the population of mothers of children under two in these areas.

The OR protocol was implemented as planned, with no modifications. There were ultimately some challenges in the final quantitative assessment, beyond the control of HKI. The NGO partner that conducted the baseline survey under supervision of HKI was no longer available to conduct the endline survey. HKI contracted a well-known respected local research firm to collect the data and do the basic analysis. In at least one instance, a key question on food security was asked differently on the final survey than it had been asked at baseline, making the results non-comparable. There may have been some other discrepancies in data collection. HKI incurred extra expense for this



data analysis and invested much additional staff time in reviewing the results and coaching the research firm.

HKI promised in the original OR plan to conduct advanced analysis on the final results; however, the plan did not lay out what the analysis might include nor define exactly who would conduct this analysis. This lack of defining the responsibility, including an alternate plan in case of staff changes, resulted in considerable delay in getting analyses beyond the basic frequencies.

The OR activities were carried out on schedule.

The complete OR results, discussion of findings and discussion of factors that may have influenced results are found in Section F.1 in this report and in Annex 12. Plans for dissemination of results are found on page 31 above. Decisions to replicate or scale-up EHFP within Nepal were made by donors and government prior to the completion of the OR.

## **BB. Potential for Scale-up**

The AAMA project has served as the basis for new USAID Nepal nutrition initiatives including the Integrated Nutrition Project RFA which was awarded to a consortium that includes HKI. Now called the Suaahara Project, this includes scaling up the EHFP model to eleven more districts over the course of the next four years. Key AAMA staff members are moving to Suaahara full-time to use their experience and lessons learned to replicate AAMA strategy.

The Essential Nutrition Actions strategy of AAMA was built into the new USAID Feed the Future project where it will be integrated with value chain agriculture and family food production. This project will target 16 to 20 districts including Baitadi and Bajura.

The Government of Nepal is preparing to operationalize their inter-sectoral plan for addressing nutrition through agriculture. There is great interest on the part of multi-lateral donors of this government program in having the government replicate parts of the AAMA strategy.

## Annex 1. Learning Briefs

### A. Engaging Local Governance for Replication and Sustainability

The Village Development Committees (VDCs) in Nepal receive funds from the central government to use for local development projects and programs. There are stipulations on how this money is to be allocated, for example, a minimum of 15% is to be spent on programs that benefit women, another 15% is to go to agriculture, etc. Often, the VDCs have difficulty in deciding how to use the funds and the default is to allocate it for infrastructure projects. At both the District Development Council (DDC) and VDC levels, there was a lack of awareness about the importance of food security and nutrition to both health and development. To address these limitations, and promote use of local government funds to replicate or sustain project activities, HKI added a governance component to the Action Against Malnutrition through Agriculture Project (AAMA). USAID Nepal granted additional funding for the governance component from 2010-2012.

AAMA was a four-year project funded through USAID’s Child Survival and Health Grants Program from 2008 -2012. Initially, the project targeted two districts Baitadi and Kailali in the Far West of Nepal, combining promotion of Essential Nutrition Actions (ENA) with Helen Keller International’s signature Homestead Food Production (HFP), which has a goal of increasing dietary diversity through promotion of home gardens and poultry. HKI and the local NGO partners trained volunteer women village model farmers (VMFs) in ENA and HFP who, in turn, each trained 30 to 40 women in their villages who were either pregnant or had a child under age two in these areas. Government service providers, including agriculture extension workers and the Female Community Health Volunteers (FCHV), were engaged in the training. Along with the training, HKI provided improved breeds of poultry and vegetable seeds or seedlings. In 2010, USAID Nepal granted funds to expand to a third district Bajura. Final evaluation results show that there was very good up-take of gardening and significant behavior changes in key nutrition and health practices.

As a part of the larger governance component, HKI facilitated district-level workshops comprised of representatives of key government agencies such as Agriculture, Livestock, Planning, Education, Women’s Development Office and the District Development Committee and NGOs. An outcome of this workshop was the decision to create VDC-Level Food Security and Nutrition Working Groups. HKI then worked with the VDC secretaries to make this new working group a reality.

In Kailali, with the District Area Development Council (DADC), HKI selected 15 of the VCDs in which to support this “bottom up” process, while all targeted VDCs were included in Baitadi and Bajura. Each of the government agencies working in the VDC were invited to form a working group, based on the terms of reference that had been written at the district-level workshop. HKI oriented the working groups to the nutrition issues in the area, AAMA project activities and the government guidelines for budget allocation. After the initial meeting, the group was formalized as the VDC Food Security and Nutrition Working Group and included FCHVs, VMFs, representatives of political parties, the heads of the agriculture service centers, the health facility, the district education office, the Ward Citizen Forum, local NGOs/CBOs, and the VDC secretary.

These community representatives developed potential projects to improve food security and dietary diversity through vegetable and poultry production, and then advocated for the support of the local Ward Citizen Forums. It is the Ward Citizen Forum that must make budget requests to the VDC prior to the annual budgeting process. In wards where AAMA was not directly working, the FCHVs were most often the link between the community, Ward Citizen Forum and the VDC.



During the 2011-2012 budget cycle, the VDCs approved funding for a wide range of related activities. They fall under replication, reinforcement, or sustainability of AAMA activities.

- Replication of selected AAMA activities in additional wards or among marginalized populations including provision of agriculture inputs to additional families, training in agriculture or ENA, or specific training such as demonstrations to prepare the complementary food called *jaulo*.
- Provision of additional inputs to AAMA beneficiaries including containers for storing bio-pesticides, tubing for micro-irrigation, poultry vaccine, and seeds.
- To sustain and expand project activities, VDCs have selected 15 VMFs in Kailali and 8 in Baitadi to become “Local Resource Persons”, a VDC-supported position to provide technical assistance and training to community members.

**Table K: Village Development Committee Support**

District	Activity	Target group reached		Inputs received	HKI Budget	VDC Budget
		New beneficiaries	AAMA Participants			
Kailali	ENA/HFP training (1 day)	2,277	664	Seed	Rs184,799 (\$ 2309)	Rs788,380 (\$ 9854)
	Seed distribution			Poultry		
	Poultry distribution			Shallow tube-well		
	Poultry vaccination			Pesticide containers		
	Micro-irrigation					
	Shallow tubewell					
	Jaulo demonstration					
	Bio-pesticide jar distribution					
	Pig raising training					
Baitadi	Seed distribution	200	253	Seed	0	Rs193,500 (\$ 2418)
	ENA training (1 day)					
	Coop improvement training					
Bajura	Activities for coming FY					Rs295,914 (\$3698)
<b>TOTALS</b>		<b>2,477</b>	<b>917</b>		<b>\$2,309</b>	<b>\$15,970</b>

The funding from the VDCs was crucial in enabling the AAMA project to reach some of the poorest and most marginalized communities in the districts. This allowed for expansion of the project to include formation of fifty new women’s groups. The total VDC investment as of July, 2012 is \$15,970. The VDC Food Security and Nutrition Working Groups will soon begin to begin planning for the next budget cycle.

An unexpected result was that the secretaries of seven additional VDCs, not targeted by the AAMA governance component in Kailali, saw the outputs and took the initiative to replicate the “bottom up” process, ultimately funding similar activities in their VDCs.

The other goal of the governance component was to bring together the government entities working in the districts and VDCs to promote inter-sectoral collaboration to improve food security and nutrition. As a result, the government line agencies at both the district and VDC levels have begun to undertake joint planning, monitoring and supervision in their respective plans of action related to food security and nutrition. This has promoted coordination within VDCs of certain related activities in the budget, instead of each entity pursuing separate interests in the budget process.

A lesson learned from the governance component is that it should be initiated early in the project in order for the VDC-level process to occur in more than one budget cycle. This would increase potential for institutionalization of the Food Security and Nutrition Working Groups. If these working groups are dependent on the leadership of the VDC secretary, there is also the risk of a leadership vacuum if the VDC secretary (a government employee) is transferred to another post.

## **B. Community capacity building: An approach to improve household food security and nutrition**

Although there has been significant reduction in maternal and child mortality rates, progress on the nutritional status of women and children in Nepal has been slow. According to the 2011 Demographic and Health Survey, the prevalence of stunting, wasting, and underweight among children under five in the Far-Western Region of Nepal was 46.4%, 10.9%, and 32.6%, respectively. Anemia prevalence was also extremely high among both women of reproductive age and young children, at 36% and 49%, respectively. Both lack of availability of nutrient-rich foods and a lack of knowledge about nutrition and infant and young child feeding contribute to the high rates of malnutrition.

There has been minimal agricultural extension as well as a lack of programs to address nutrition comprehensively. For example, Nepal’s highly effective Female Community Health Workers (FCHVs) had a rather narrow nutrition mandate, focusing mainly on micronutrients (e.g. distribution of Vitamin A capsules and iron supplements). The lack of agriculture extension and lack of knowledge about consumption and cultivation of nutrient-rich food at household level created a gap in availability and consumption of diverse foods.

AAMA’s challenge was to provide the knowledge and accessibility that would bring together nutrition and agriculture, and thus reduce malnutrition. The approach of Enhanced Homestead Food Production (EHFP) was designed to build the capacity of NGOs, FCHVs, Village Model Farmers (VMFs), Homestead Food Production Beneficiaries (HFPBs), and to engage FCHVs as VMFs where possible to build on their experience in leading mothers groups, service provision and their good reputation in their communities. The goal of the capacity building was to build knowledge and skills at the household level so that improved agriculture and nutrition practices would be introduced and maintained through a network of sustainable linkages.

## Approach

The project components have addressed two complementary facets of undernutrition: household food security and nutrition knowledge. The first component, Homestead Food Production (HFP), established Village Model Farms managed by women, almost 70% of whom are FCHVs, and linked them with groups of HFPBs, who are pregnant or women with children under two. The VMFs demonstrated improved HFP techniques using project and household inputs, and were used to train HFPBs in gardening and poultry-raising. They provided a venue for ongoing technical assistance as the HFPBs developed their own gardens and for regular discussion groups.

The second aspect of the program promoted improved nutrition knowledge and practices using the Essential Nutrition Actions (ENA) framework, both via the HFP component and by building the capacity of FCHVs to address nutrition more broadly. The ENA framework includes training in the skills for counseling for behavior change as well as in knowledge of the practices that promote optimal maternal, infant and young child nutrition (immediate, exclusive and continued breastfeeding, complementary feeding, the care of sick children, women's nutrition, the integrated control of anemia, and control of vitamin A and iodine deficiency). Either in their capacity as VMFs (where they chose to play this role as well) or as FCHVs working collaboratively with the local VMF, they trained HFPBs in ENA and in related reproductive and child health practices through monthly meetings at the VMFs. In turn, HFPBs were responsible for reaching out to 5-10 other pregnant and breastfeeding mothers in their communities to share what they learned about optimal nutrition (and HFP) practices.

Staffs from the line ministries of agriculture and health were also involved in program actions, provided technical support, attended meetings and trainings, and supervised FCHVs and VMFs, while the Village Development Committees (VDCs) offered support for training and provided supplies and equipment, such as seeds and irrigation tubing.

## Results

The project strengthened community capacity in Kailali District across these objectives. The enhanced capacity of FCHVs for providing support for nutrition in their communities was evident at endline, with FCHVs providing nutrition advice to over 80% of mothers in Kailali. For example, at baseline, only 51.4% of women had received counseling on exclusive breastfeeding until 6 months, compared to 95.7% at endline. The evidence from bi-annual LQAS also revealed positive trends in meeting participation and technical support from FCHVs in Kailali. For instance, the proportion of HFPBs who reported visiting or being visited by their FCHV in the last month increased from 74.1% for LQAS1 to 91.0% for LQAS3.

Comparing baseline and endline results, there were significant improvements in both food production and nutrition. The percentage of households with improved and modern homestead gardens in Kailali increased from 11.6% at baseline to 59.8% at endline. The mean number of micronutrient-rich vegetables grown by each household per year increased from 2 to 5.78. There was an increase from 59.9% to 79.1% in the proportion of children born in the past 24 hours who were put to the breast within one hour of birth. The proportion of children ages 6-24 months receiving foods from 4 or more food groups the previous day increased from 20.8% to 78.3%. These improvements corresponded with a positive impact on nutritional indicators in Kailali. The percentage of underweight children 0-24 months decreased from 30.6% to 20.7%; the percentage of stunting in children 0-24 months decreased from 28.9% to 18.3%; and the percentage of anemic



children 6-24 months decreased from 57.7% to 48.8%. There was also a modest decrease in the proportion of anemic women of reproductive age, from 36% to 32.3%.

## Conclusions

The findings from the endline survey confirm that the intervention has successfully built the capacity of local NGOs and community members to understand the dimensions of household food security and to address undernutrition. As government agencies and the VDCs have started to take ownership of and participate in the AAMA initiative, there has been considerable progress towards sustainability. Government agencies and VDCs are now supporting VMFs and providing HFP inputs in many communities.

### C. Strengthening Disadvantaged Families Through Agriculture and Nutrition in Baitadi District of Nepal

Although Nepal banned caste-based discrimination in 1963, caste and ethnicity still have a significant influence on health indicators. Disadvantaged castes in Nepal, including Dalits, disadvantaged Janajati, and disadvantaged non-Dalit Terai caste groups, tend to be poorer, have lower life expectancy, and have poorer health indicators than more advantaged castes (World Bank & DFID Nepal 2006). Compared to Brahmins and Newars, Dalit children have a much higher rate of under-five mortality and have two times the risk of death within their first year of life (World Bank & DFID Nepal 2006). Research by the World Bank suggests that there is also a significantly higher prevalence of underweight and stunting among Dalit, Terai Middle Caste, and Muslim children in Nepal (World Bank & DFID Nepal 2006).

## Approach

Given these disparities, it is critical that health interventions in Nepal reach the most marginalized groups. Helen Keller International's (HKI) Action Against Malnutrition through Agriculture (AAMA) was an integrated homestead food security and nutrition education intervention that aimed to improve household food security and nutrition in women of reproductive age and their children under two in the Far Western region of Nepal. AAMA addressed two underlying causes of undernutrition: household food security and nutritional care. The first factor is addressed using HKI's Homestead Food Production (HFP) approach to improve food access and quality at the household level, while the second is addressed through the Essential Nutrition Actions (ENA) framework, which aims to improve nutritional knowledge, including infant and young child feeding.

Baitadi, one of the AAMA districts, is a remote hill area in the Far Western region where nearly 85% of households are food insecure, according to a 2009 HKI survey. Baitadi also has a large Dalit population, with Dalits comprising about 20% of the total population (DLSO Baitadi 2010/2011). HKI used very specific strategies to assure Dalits were reached with project activities including organizing mothers' groups for them led by a Dalit woman and assisting non-Dalit leaders of primarily Dalit groups to overcome caste barriers in their interactions.

## Results

Consistent with national data, AAMA data at both baseline and endline suggest that children from disadvantaged groups in Baitadi district have poorer nutrition indicators than other groups. In both intervention and control areas in Baitadi at baseline and endline, the prevalence of underweight was significantly higher in Dalit children compared to children from non-Dalit families. Dalit children were also significantly more likely to be stunted than non-Dalit children at both time points in the intervention area. Similarly, in both intervention and control areas, there was a higher prevalence of wasting in Dalit children than in non-Dalit children at both time points. While the difference in the intervention area was not significant, Dalit children in the control area were significantly more likely to be anemic than non-Dalit children (Table 1).

Dalit women were also more likely than non-Dalit women to have poor nutrition outcomes. In both the intervention and control areas, Dalit women were more likely to be anemic than non-Dalit women, although the difference was statistically significant only in the control areas.

The prevalence of stunting, underweight, wasting, and anemia among Dalits in Baitadi showed greater improvement than non-Dalits in many of the outcome indicators. In the intervention area, Dalits children showed a greater improvement in stunting, underweight, and reduction in anemia than non-Dalits. Although anemia in mothers increased in all groups, there was a smaller increase in Dalits in the intervention area compared to non-Dalits.

Dalits in the intervention area also showed greater improvement in stunting, underweight, and prevalence in anemia in children compared to Dalits in the control area. There was an increase in the prevalence of anemia among Dalit mothers in both intervention and control areas, but the increase was greater in the control area (Table 1). This evidence suggests that Dalits in the intervention area show a tendency for greater improvement in nutrition indicators than non-Dalits and that the intervention appears to have increased this improvement.

**Table 1: Prevalence of nutritional outcomes by caste/ethnicity in Baitadi**

Outcome (%)	Control area			Intervention area		
	Baseline	Endline	Change	Baseline	Endline	Change
<b>Stunting</b>	**	ns		**	**	
Dalit	75.1	68.7	-6.4	72.6	62.2	-10.4
Other	64.0	62.7	-1.3	54.2	52.4	-1.8
<b>Underweight</b>	**	**		**	**	
Dalit	59.1	52.5	-6.6	62.8	48.4	-14.4
Other	46.1	37.5	-8.6	38.1	37.9	-0.2
<b>Wasting</b>	ns	*		*	**	
Dalit	13.8	12.7	-1.1	15.4	15.4	0
Other	9.7	8.8	-0.9	9.7	8.9	-0.8
<b>Anemia in 12-47 mo. children</b>	**	**		**	ns	
Dalit	49.7	57.0	+7.3	41.0	37.2	-3.8
Other	32.5	44.9	+12.4	29.7	35.1	+5.4
<b>Anemia in mothers</b>	*	**		**	ns	
Dalit	33.1	50.4	+17.3	33.8	35.7	+1.9
Other	24.8	41.7	+16.9	23.0	30.6	+7.6

\*\*p<0.1; \*p<0.05, ns= not significant



## Conclusions

While the results from AAMA show continued disadvantages in nutritional status among Dalits compared to non-Dalits in Baitadi, they also suggest a reduction in the gap. Given that Dalits in Nepal have much lower nutrition indicators than non-Dalits, it is important to highlight such improvements. This evidence demonstrates the positive impact these interventions can have and suggests that disadvantaged groups can benefit greatly from programs like AAMA and that such approaches have the potential to narrow the gap in nutritional indicators.

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### D. Advancing the Kamaiya in Kailali District of Nepal

AAMA was a four-year project funded through USAID’s Child Survival and Health Grants Program from 2008 -2012. The project targeted three districts Bajura, Baitadi and Kailali in the Far West of Nepal, combining promotion of Essential Nutrition Actions (ENA) with Helen Keller International’s signature Homestead Food Production (HFP), which has a goal of increasing dietary diversity through promotion of home gardens and poultry. HKI and the local NGO partners trained volunteer women leaders (village model farmers, or VMFs) in ENA and HFP who, in turn trained 30 to 40 women in their village who were either pregnant or had a child under age two. Government service providers, including agriculture extension workers and the Female Community Health Volunteers (FCHV), were engaged in the training. Along with the training, HKI provided improved breeds of poultry and vegetable seeds or starts. Final evaluation results show that there was very good up-take of gardening and significant behavior changes in key nutrition and health practices, along with a significant reduction of stunting in Kailali District.

Halfway through the project, staff realized there was a need for a concerted effort to reach more disadvantaged sub-groups. Including the Kamaiya, former bonded laborers in the Terai region of Kailali. Historically, they lived on land that was later claimed by large landowners who came from other parts of Nepal. They became bonded to the landowners in exchange for the right to continue living on the land or because they incurred indebtedness to the land owners. For generations, the Kamaiya exchanged agricultural and domestic labor for small remuneration or share cropping privileges. In July 2000, Nepal passed a law banning the Kamaiya system and granted the laborers small plots of land to cultivate and provided some job skills training.

Working through the local government, the AAMA project chose to work with the Kamaiya in Chaumala Village Development Committee (VDC), Ward No. 7, where the rates of undernutrition were especially high. AAMA organized 40 beneficiaries (women who were pregnant or had children under two) into two HFPB groups, training two of the women as VMF leaders. The VDC provided funds for ENA and HFP trainings, poultry and vegetable seeds, and containers to store bio-pesticides, while AAMA provided overall technical assistance and supervision. Members of the VDC

and of the food security and nutrition steering committee visited to monitor progress. Near the project end, the VDC selected one of the women to serve as an ongoing Local Resource Person (LRP) and who will continue to receive incentives and training to support these groups.

The location of the land has been a challenge for the Kamaiya beneficiaries: it is on a riverbank, making it prone to flooding and difficult to cultivate vegetables during the rainy season. Despite this, the beneficiaries are motivated to continue the gardening efforts, and the VMF, Local Resource Person and Female Community Health Volunteer (FCHV) have expressed their commitment to continuing their support. The participating Kamaiya families have also learned how to participate in local governance and to petition for resources to help their community.

### **References**

Sharma, S., Basnyat, B., & G.C., G. (2001). *Bonded labour among child workers of the Kamaiya system: A rapid assessment*. Geneva: International Labour Organization, International Programme on the Elimination of Child Labour.

The World Bank & DFID Nepal. (2006). *Unequal citizens: Gender, caste, and ethnic exclusion in Nepal (Summary)*. The World Bank. DFID Nepal.

## Annex 2. List of Project-related Publications and Presentations

Nepal Nutrition and Food Security Bulletin 1: Household Food Insecurity and Nutritional Status of Children aged 6-23 months in Kailali District of Nepal. Kathmandu: Helen Keller International Nepal, 2010.

Nepal Nutrition and Food Security Bulletin 2: Household Food Insecurity is Highly Prevalent and Predicts Stunting Among Pre-School Children and Anemia Among Their Mothers in Baitadi District of Nepal. Kathmandu: Helen Keller International Nepal, 2010.

Nepal Nutrition and Food Security Bulletin 3: Breastfeeding and Complementary Feeding Practices are less than Adequate among Mothers of Children 12-23 Months in the Baitadi District of Nepal. Kathmandu: Helen Keller International Nepal, 2010.

Nepal Nutrition and Food Security Bulletin 4: Designing a Context-Specific Behaviour Change Strategy to Improve Key Infant and Young Child Feeding Practices in Kailali and Baitadi Districts of Nepal: Not a Cookie-Cutter Approach. Kathmandu: Helen Keller International Nepal, 2010.

Nepal Nutrition and Food Security Bulletin 5: Multisectoral Governance for Food Security and Nutrition in Nepal. Kathmandu: Helen Keller International Nepal, 2012.

Osei A, Pandey P, Spiro D, Nielsen J, Shrestha R, Tulukdar Z, Quinn V, Haselow N (2010). Household food insecurity and nutritional status of children aged 6-23 months in Kailali district of Nepal. *Food and Nutrition Bulletin*; 31(4), 483-494.

Locks LM, Pandey PR, Osei AK, Spiro D, Adhikari D, Haselow NJ, Quinn VJ and Nielsen JN. Using Formative Research to Design a Context-Specific Behavior Change Strategy to Improve Infant and Young Child Feeding Practices and Nutrition in Nepal. *Maternal and Child Nutrition* (in press).

## Annex 3. Project Management Evaluation

### Planning

Initial planning for the project included involvement of Ministries of Health, Agriculture, and Livestock at the national level. There was less engagement of district-level officials and HKI now acknowledges that would have made a difference in having a closer partnership with them at local levels from the beginning. In spite of this, the local and district government agencies did become quite engaged by the end of the project as was described earlier in the report and in the learning brief on governance.

At the national level, HKI maintained close cooperation with the relevant ministries on matters of related policy and fully engaged them for development of project tools. At the district level, HKI participated in reproductive health coordination meetings, and at the regional level, in regular regional health review meetings.

The DIP was comprehensive in most areas. HKI could have used more support from MCHIP in designing the OR, particularly on sampling. This was discussed in the narrative on the section describing the OR and is covered in the recommendations.

### Supervision of Project Staff

Supervision of project activities improved after the MTE when more field supervisors were hired for each district, making it possible for them to have more frequent contact with the VMFs. They were also given a clearer job description and guides on what to do during the supervisory visits. The detailed VMF registers were eliminated which relieved the field supervisors of hours spent manually copying these to feed into the M&E system. HKI provided field supervisors training on participatory monitoring approaches and supported the NGOs in developing a supervision plan. It is probable that the NGOs will continue to use the learning in supervision in new projects.

District agriculture and livestock staff know most of the VMFs and may continue to have contact with them, although this may be mostly at the initiative of the VMFs due to lack of government funding for frequent field visits by their staff. In the seven VDCs in Kailali where the DHO implemented growth monitoring at HFPB meetings, there will be continued contact with government health workers.

### Human Resources and Staff Management

There were no issues in partner or staff relations. There was high turn-over among field supervisors during the first half of the project due to their work load and low benefits. To rectify this, after the MTE, three more field supervisors were added for each district. Further, the add-on Micronutrient Supplement Project added four more for Baitadi specifically for ENA. Benefits were increased by covering cost of cell phones. Their work was also laid out more clearly with better definition of responsibilities and a schedule of messaging.

HKI did not conduct organizational capacity assessments of the two NGOs in Baitadi and SMJK, who had good track records, but conducted one with WDF in Bajura, which was a new partner with no previous experience using USAID funding. HKI used the results to build the management capacity of WDF, particularly in procurement, budget management and accounting.

Transition of project staff has been facilitated by HKI's role in the new Suaahara Project. All Kathmandu-based staff are being shifted to Suaahara and most key district-level staff.

## Financial Management

Management of the budget appears to have been very adequate. All CSHGP budgets are tight and HKI has done their utmost to carry out planned project activities within these constraints which meant reducing the number of training days and dropping the plan for widespread distribution of fruit trees. Assessing burn rate is complicated by the additional funding allocated mid-way through the project by USAID Nepal to add Bajura District and a governance component. The governance activity had to coincide with the Government of Nepal fiscal year which starts July 1. Although the USAID Nepal funds were added to the AAMA budget in September, 2010, the governance activities could not start until mid-2011 to coincide with VDC planning. This resulted in funds available to cover the no-cost extension granted by CSHGP with governance activities continuing until December, 2012.

As described earlier, any sustainability of project activities is dependent on the Village Development Committees who have the option of deciding to fund replication or to fund the VMFs as Local Resource Persons. Please, see the Learning Brief on Governance for details.

HKI has external auditors that annually perform the A-133 audit required by the Office of Management and Budget. HKI executed an MOU with each local partner (NTAG, NNSWA and SMJK) which requires that they provide HKI with monthly financial reports documenting all expenses. They also provide HKI with copies of their own annual audits performed according to generally accepted accounting practices. All partners are fully responsible and meeting their financial responsibilities to HKI.

NTAG and NNSWA have fully developed budgeting capabilities that allow them to develop budgets and perform for a range of international organizations; SMJK is still developing these skills but has benefitted from its collaboration with HKI. WDF had no experience in handling external funding before joining AAMA but now demonstrated their newfound capacity in writing a proposal and accompanying budget for participation in *Suaahara* Project.

*Adequate resources:* The proposal was developed at a time when HKI/Nepal had no resident technical staff, so a number of key costs (professional salaries, government per diem requirements, logistical costs for delivering chicks to each VDC in Baitadi) were significantly under budgeted. The project is overly ambitious for the relatively limited financing available through the CSHGP, but HKI has mobilized considerable resources to supplement the original budget and is committed to continuing to increasing funds available.

*Partner capacity:* WDF and SMJK capacity has been strengthened through its partnership with HKI and the demands that have been made in the financial accounting (as well as other areas) and mentoring by HKI financial office. NNSWA and NTAG have a long history of collaboration with INGOs and have full capacity to develop financial plans for their future endeavors.

## Logistics

The logistics of poultry distribution turned out to be more cumbersome than HKI participated since it involved finding quality hatcheries and establishing brooding arrangements. This delayed

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distribution by two to three months, particularly affecting Bajura District which had a short project time-frame. There were no other problems with logistics that affected the project. The donation of an additional vehicle by USAID Nepal from a terminating project facilitated logistics in Bajura. Continuation of any project activities is now the responsibility of the Village Development Committees and the local government services for health and agriculture. The AAMA program itself is not being continued, only those elements which the VDCs choose to fund and for which the VMFs will solicit technical and logistical support from the agriculture service centers.

## Information Management

The system to measure progress towards objectives, that is, the M&E system was discussed under Data Quality in the report. The project did not attempt to strengthen government data collection. In addition to the baseline and final surveys, HKI conducted annual mini-surveys using LQAS sampling. The data was collected by field staff using PDAs which sent the data directly to the Kathmandu office. The reports from this data could be compiled within an hour of receiving the data. This enabled HKI to use the data to take immediate actions to improve implementation. Examples of how the data were used for continual learning and improvement of the project include:

- When HFPB meeting attendance began to drop, the project BCC coordinator developed new attractive activities for the meetings such as recipe contests for products, cooking demonstrations on preparing weaning foods, etc.
- Specific agriculture-related messages were developed based on seasons, with four messages disseminated per season.
- HKI convened a technical meeting with livestock service centers to discuss the issues of poultry disease and creating a feed from locally available materials.

Data from the baseline and formative research were used in two peer-reviewed publications of HKI. The Food and Nutrition Bulletin published “Household food insecurity and nutritional status of children aged 6-23 months in Kailali district of Nepal” in the December 2010 issue. A second manuscript, “Using Formative Research to Design a Context-Specific Behavior Change Strategy to Improve Infant and Young Child Feeding Practices and Nutrition in Nepal has been accepted for publication in *Maternal and Child Nutrition*. HKI has published 5 bulletins related to AAMA project baseline in the Nepal Nutrition and Food Security Bulletin, which is published by HKI. These bulletins are as follows:

- *Household Food Security and Nutritional Status of Children 6-23 Months in Kailali District of Nepal.*
- *Household Food Insecurity is Highly Prevalent and Predicts Stunting among Preschool Children and Anemia among their Mothers in Baitadi District of Nepal.*
- *Breastfeeding and Complementary Feeding Practices are Less Than Adequate among Mothers of Children 12-23 Months in the Baitadi District of Nepal.*

Project staff in Nepal, the local NGO partners, and HQ backstop, fully understand the project outcomes based on the final data. Results will be shared with the government partners and USAID Nepal. There are no plans to collect additional data.

## Technical and Administrative Support

During the development of the operations research design, the MCHIP advisor assigned to the project provided the HQ backstop valuable input on questions such as sampling frames and strategies to minimize spill-over between intervention and control areas. This was particularly helpful as our Asia-Pacific Regional (APR) Nutrition Advisor did not come on board until just before the DIP workshop. HKI also received considerable design input from colleagues at the International Food Policy Research Institute (IFPRI), with whom we unsuccessfully collaborated on a proposal for supplementary funding to support the impact evaluation. IFPRI has highly specialized expertise in nutrition research, and provided technical input that may not be realistic to expect from the MCHIP team.

The HQ backstop and APR nutrition advisor both have PhD's in nutrition and were closely engaged in all phases of the research, including overall design, sampling frame, development of relevant qualitative and quantitative questionnaires, analysis and write-up. Over the project the HQ backstop probably devoted as much as 20% LOE, while the APR advisor may have devoted slightly less (~10%). A Leland Hunger Fellow assigned to the APR office during the last year of the project also provided extensive and valuable support to the quantitative data analysis. The location of these advisors far removed from the research site and country office did prove challenging at times, as was the fact that all had numerous other responsibilities to juggle. A dedicated primary investigator is certainly desirable, but the funding available for these projects is very limited.

## Management Lessons Learned

HKI and partners originally looked for health backgrounds in hiring the NGO staff, but soon realized persons with this profile did not have the required social mobilization skills. The requirements were changed in hiring new field supervisors, giving preference to people with previous work in community mobilization and participation.

In initial hiring for Baitadi, there was a cultural barrier of hiring women in that they cannot move between communities alone. HKI and the NGO partner now realize they could have hired 2 or 3 women to work together as a team across VDCs. This lesson is being applied to hiring in Suaahara.

AAMA also learned that more effort should have been made from the onset to preferentially hire staff and recruit VMFs from the disadvantaged groups (Dalits and Tharus) in the VDCs where these marginalized populations are predominant. There were cultural barriers to interaction that had to be creatively overcome.

As described above, AAMA had minimal engagement with local ministry officials or VDCs during the planning and start-up of AAMA, rather, this emphasis was added on after mid-term. This lesson is being immediately applied to the Suaahara Project, where work started from day one with local government.

While quarterly review meetings were held with the field staff and local partners, the Kathmandu staff did not come to these meetings, which would have been very useful. Further, the meetings were held in each district and it would have been helpful to have occasional cross-district review in order for the local partners and district coordinators to share learning and experiences.





## Annex 4. Work Plan Table

Activities	Objective Met	Activity Status
Form National Advisory Committee and hold meetings	Yes	completed
Preparation and submission of DIP	Yes	completed
Strategic Planning Workshop to Develop DIP	Yes	completed
Annual Planning and Review Meeting	Yes	completed
Quarterly meetings with USAID	Yes	completed
Preparation for baseline survey and organize community	Yes	completed
Conduct baseline survey including HemoCue® - Kalali	Yes	completed
Conduct baseline survey including HemoCue®) - Baitadi	Yes	completed
Conduct baseline survey to assess innovation component	Yes	completed
Review of existing ENA related materials to identify strengths and gaps	Yes	completed
Formative research with partners to develop ENA messages for BCC activities and training	Yes in Kathmandu	completed
ENA/BCC materials/tool development, pre-testing and production	Yes	completed
SHOUT Organizational Capacity and Viability Assessment of local NGO partners		
<b>Major Activities</b>		
Monitoring and supervision of project activities	Yes	Completed
Conduct MTOT HFP foundation and ENA/BCC trainings for AAMA Partners staff	Yes	Completed
Selection of VMFs - Kailali	Yes	Completed
Selection of VMFs - Baitadi	Yes	Completed
Conduct HFP for VMF owners & District Officers – Kailali	Yes	Completed
Conduct HFP for VMF owners & Ilaka Officers – Baitadi	Yes	Completed
Conduct ENA/BCC trainings for FCHVs & District Officers – Kailali	Yes	Completed
Conduct ENA/BCC trainings for Ilaka FCHVs & Ilaka Officers – Baitadi	Yes	Completed
Establishment of VMFs (Inputs and TA) - Kalaili	yes	Completed
Establishment of VMFs (Inputs and TA) - Baitadi	Yes	Completed
Selection of HFPB Groups – Kailali	Yes	Completed
Selection of HFPB Groups - Baitadi	Yes	Completed
Conduct basic HFP and ENA Training for HFPBs - Kalali	Yes	Completed
Conduct basic HFP and ENA Training for HFPBs - Baitadi	Yes	Completed
Forge Linkages between VMFs and FCHVs & HFPBs	Yes	Completed



<b>Activities</b>	<b>Objective Met</b>	<b>Activity Status</b>
Brief Quarterly progress reports to USAID and Partners	Yes	Completed
Preparation and submission of annual report to USAID	Yes	Completed
Refresher training on HFP for District and NGO staff - Kailali	Yes	Completed (during monthly meeting)
Refresher training on HFP for Ilaka and NGO staff - Baitadi	Yes	Completed (during monthly meeting)
Refresher training on ENA/BCC for District and NGO staff - Kailali	Yes	Completed (during monthly meeting)
Refresher training on ENA/BCC for Ilaka and NGO staff - Baitadi	Yes	Completed (during monthly meeting)
Refresher trainings on HFP and ENA/BCC for FCHVs - Kailali	Yes	Completed (during monthly group meeting but not to all FCHVs)
Refresher trainings on HFP and ENA/BCC for FCHVs - Baitadi	Yes	Completed (during monthly group meeting but not to all FCHVs)
Refresher training for HFPBs on HFP and ENA - Kailali	Yes	Completed (during monthly group meeting)
Refresher training for HFPBs on HFP and ENA - Baitadi	Yes	Completed (during monthly group meeting)
Conduct Baseline and Select HFPBs/FCHVs for Sprinkles intervention	Yes	Completed
Distribution of Sprinkles and program implementation	Yes	Completed
Promotion of development materials	Yes	Completed
Process Monitoring, Supervision, Feedback, Implementation Adjustments	Yes	Completed
Midterm evaluation field work	Yes	Completed
Midterm evaluation report submitted to USAID	Yes	Completed
Results dissemination workshop on midterm evaluation	Yes	Completed
Revision of project work plan according to midterm results	Yes	Completed
Preparation and implementation of end line assessment	Yes	Completed
Conduct end line assessment including HemoCue®)	Yes	Completed
Conduct end line survey to assess innovation component	Yes	Completed
Conduct participatory final evaluation	Yes	Completed
Final evaluation report submitted to USAID	Yes	Completed
Results dissemination on final evaluation	Yes	Completed (USAID Nepal)



## Annex 5. Rapid Catch Tables

**Table 1: Priority Child Health Indicators for RAPID CATCH for sample children <24 months of Kailali**

	<b>Indicators</b>	<b>Baseline (N=497)</b>	<b>Endline (N=696)</b>
<b>Maternal and Newborn Care</b>			
1	% of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child	31.8%	87.7% (N=673)
2	% of mothers of children age 0-23 months who received at least two tetanus toxoid before the birth of the youngest child	67.2% (N=387)	49.2% (N=666)
3	% of children age 0-23 months whose births were attended by skilled personnel	20.7%	43.4%
4	% of children age 0-23 months who received a post-natal visit from an appropriately trained health worker within 2 days after birth	12.3%	0%
6	% of mothers of children age 0-23 months who are using a modern contraceptive method	35.5% (N=465)	39.4%
<b>Breastfeeding and Infant and Young Child Feeding</b>			
6	% of children age 0-5 months who were exclusively given breast milk the day prior to the interview	79.1% (N=129)	82.9% (N=193)
7	% of children age 6-23 months fed according to a minimum of appropriate feeding practices	46.5% (N=368)	85.7% (N=503)
<b>Vitamin A Supplementation</b>			
8	% of children age 6-23 months who received a dose of vitamin A in the last 6 months: card verified or mother's recall	86.6% (N=229)	85.7% (N=314)
<b>Immunization</b>			
9	% of children age 12-23 months who received measles vaccine according to the vaccination card or mother's recall by the time of the survey	92.1%	95.9%
10	% of children age 12-23 months who received DPT1 according to the vaccination card or mother's recall by the time of the survey	95.2%	99.0%
11	% of children age 12-23 months who received DPT3 vaccine according to the vaccination card or mother's recall by the time of the survey	82.5%	97.8%
<b>Malaria</b>			
12	% of children age 6-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after fever began	32.8% (N=67)	1.0% (N=98)
13	% of children age 0-23 months who slept under an insecticide-treated bed net the previous night	2.2% (N=73)	67.2% (N=674)
<b>Control of diarrhea</b>			
14	% of children age 6-23 months with diarrhea in the last two weeks who received oral rehydration solution(ORS) and/or recommended home fluids	9.6% (N=114)	66.9% (N=121)
<b>Acute Respiratory Infections</b>			
15	% of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provides	30.7%	42.1%
<b>Point of Use Water Treatment</b>			
16	Percentage of households of children age 0-23 months that treat water effectively	4.8%	5.9%
<b>Appropriate Hand Washing Practices</b>			
17	Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing	43.5% (N=484)	83.3% (N=664)
<b>Anthropometry</b>			
18	% of children age 0-23 months who are underweight (-2SD for the median weight for age, according to WHO/NCHS reference population)	30.6% (N=484)	20.7% (N=695)

**Table 2:** Priority Child Health Indicators for RAPID CATCH for sample children <24 months of Baitadi  
(data from intervention Ilakas only for children aged 12-23 months)

	<b>Indicators</b>	<b>Baseline (N=401)</b>	<b>Endline (N=412)</b>
	<b>Maternal and Newborn Care</b>		
1	% of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child	29.2%	67.7%
2	% of mothers of children age 0-23 months who received at least two tetanus toxoid before the birth of the youngest child	70.1%	75.2%
3	% of children age 0-23 months whose births were attended by skilled personnel	22.9%	17.7%
4	% of children age 0-23 months who received a post-natal visit from an appropriately trained health worker within 2 days after birth	19.2%	23.8%
6	% of mothers of children age 0-23 months who are using a modern contraceptive method	24.3 %	22.8%
	<b>Breastfeeding and Infant and Young Child Feeding</b>		
6	% of children age 0-5 months who were exclusively given breast milk the day prior to the interview <sup>1</sup>	60% (N=105)	77.9% (N=104)
7	% of children age 6-23 months fed according to a minimum of appropriate feeding practices	57.6%	79.4%
	<b>Vitamin A Supplementation</b>		
8	% of children age 6-23 months who received a dose of vitamin A in the last 6 months: card verified or mother's recall	90.8%	97.1%
	<b>Immunization</b>		
9	% of children age 12-23 months who received measles vaccine according to the vaccination card or mother's recall by the time of the survey	86.7%	97.3%
10	% of children age 12-23 months who received DPT1 according to the vaccination card or mother's recall by the time of the survey	82.8%	98.1%
11	% of children age 12-23 months who received DPT3 vaccine according to the vaccination card or mother's recall by the time of the survey	72.3%	97.6%
	<b>Malaria<sup>2</sup></b>		
12	% of children age 0-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after fever began	0%	0%
13	% of children age 0-23 months who slept under an insecticide-treated bed net the previous night	0%	0%
	<b>Control of diarrhea</b>	(N=21)	(N=52)
14	% of children age 0-23 months with diarrhea in the last two weeks who received oral rehydration solution(ORS) and/or recommended home fluids	70%	73.1%
	<b>Acute Respiratory Infections</b>	(N=22)	(N=44)
15	% of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provider	81.0%	54.5%
	<b>Point of Use Water Treatment</b>		
16	Percentage of households of children age 0-23 months that treat water effectively	2.0%	10.9%
	<b>Appropriate Hand Washing Practices</b>		
17	Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing	14.7%	57.3%
	<b>Anthropometry</b>		
18	% of children age 0-23 months who are underweight (-2SD for the median weight for age, according to WHO/NCHS reference population)	42.0%	35.7%

<sup>1</sup> Although the operations research does not cover this age range, the surveyors were instructed to include all children in surveyed households who were <6 months for these questions.

<sup>2</sup> Baitadi is not a malaria endemic area

**Table 3: Priority Child Health Indicators for RAPID CATCH for sample children <24 months of Bajura**

	<b>Indicators</b>	<b>Baseline (N=450)</b>	<b>Endline (N=450)</b>
	<b>Maternal and Newborn Care</b>		
1	% of mothers of children age 0-23 months who had four or more antenatal visits when they were pregnant with the youngest child	23.4% (N=351)	57.1%
2	% of mothers of children age 0-23 months who received at least two tetanus toxoid before the birth of the youngest child	72.3% (N=447)	62.9%
3	% of children age 0-23 months whose births were attended by skilled personnel	18.6%	28.0%
4	% of children age 0-23 months who received a post-natal visit from an appropriately trained health worker within 2 days after birth	13.8%	29.3%
6	% of mothers of children age 0-23 months who are using a modern contraceptive method	17.4% (N=432)	26.0%
	<b>Breastfeeding and Infant and Young Child Feeding</b>		
6	% of children age 0-5 months who were exclusively given breast milk the day prior to the interview	79.4% (N=107)	78.3% (N=74)
7	% of children age 6-23 months fed according to a minimum of appropriate feeding practices	34.6% (N=339)	90.7% (N=378)
	<b>Vitamin A Supplementation</b>	<b>(N=316)</b>	<b>(N=378)</b>
8	% of children age 6-23 months who received a dose of vitamin A in the last 6 months: card verified or mother's recall	86.0%	95.9%
	<b>Immunization</b>	<b>(N=187)</b>	<b>(N=315)</b>
9	% of children age 12-23 months who received measles vaccine according to the vaccination card or mother's recall by the time of the survey	82.4%	95.9%
10	% of children age 12-23 months who received DPT1 according to the vaccination card or mother's recall by the time of the survey	90.9%	98.14%
11	% of children age 12-23 months who received DPT3 vaccine according to the vaccination card or mother's recall by the time of the survey	79.5%	94.4%
	<b>Malaria<sup>6</sup></b>		
12	% of children age 6-23 months with a febrile episode during the last two weeks who were treated with an effective anti-malarial drug within 24 hours after fever began	0%	0%
13	% of children age 0-23 months who slept under an insecticide-treated bed net the previous night	0%	0%
	<b>Control of diarrhea</b>	<b>(N=66)</b>	<b>(N=102)</b>
14	% of children age 6-23 months with diarrhea in the last two weeks who received oral rehydration solution(ORS) and/or recommended home fluids	30.3%	53.9%
	<b>Acute Respiratory Infections</b>	<b>(N=75)</b>	
15	% of children age 0-23 months with chest-related cough and fast and/or difficult breathing in the last two weeks who were taken to an appropriate health provides	68.0%	19.8
	<b>Point of Use Water Treatment</b>	<b>(N=449)</b>	
16	Percentage of households of children age 0-23 months that treat water effectively	3.1%	3.1%
	<b>Appropriate Hand Washing Practices</b>	<b>(N=449)</b>	
17	Percentage of mothers of children age 0-23 months who live in households with soap at the place for hand washing	16.4%	61.6%
	<b>Anthropometry</b>	<b>(N=449)</b>	<b>(N=447)</b>
18	% of children age 0-23 months who are underweight (-2SD for the median weight for age, according to WHO/NCHS reference population)	37.0%	43.8%

<sup>6</sup> Bajura is not a malaria endemic district.

## Annex 6. M&E Matrices

### M&E Matrix: Kailali and Bajura

<b>Project Goal: To reduce child malnutrition and related morbidity in Bajura and Kailali districts of Far Western Region<sup>7</sup></b>						
<b>Strategic Objective: To improve nutritional status among children &lt;2 and their mothers</b>						
Sub-results	Indicators	Bajura <sup>8</sup>		Kailali		
		Baseline	Endline	Baseline	Endline	Final Target
1. To improve anthropometric status of children 0-24 months	Stunting in children 0-24 months (height for age Z-score <-2 SD)	47% (42.3-51.6)	52% (47.3-56.6)	28.9% (24.8-32.9)	18.3% (15.4-21.1)	23%
	Wasting in children 0-24 months (weight for height Z-score <-2 SD)	15% (11.7-18.2)	21.8% (17.9-21.8)	9%	19%	6.3%
	Underweight in children 0-24 months (weight for age Z-score <-2 SD)	37% (32.5-41.4)	44.7% (40.1-49.2)	30.6% (26.4-34.7)	20.7% (17.6-23.7)	21%
2. To decrease anemia levels in children 6-24 months and pregnant and lactating women	Prevalence of Anemia in children 6-24 months	NC <sup>9</sup>	NC	57.7% (53.2-62.1)	48.8% (45.1-52.5)	40%
	Prevalence of Anemia in women of reproductive age (Hb<11 g/dl)	NC	NC	36% (31.7-40.2)	32.3% (28.8-35.7)	21%
	Proportion of women who reported taking full 180 days of iron supplements in previous pregnancy	33.5% (29.1-37.8)	76.8% (72.8-80.7)	43.8% (39.3-48.2)	86.7% (84.1-89.2)	53.8%
<b>Result 1: To increase the availability of MN-rich foods year round for consumption by children under 2 years, pregnant and lactating women</b>						
Sub-results	Indicators	Bajura		Kailali		
		Baseline (95% CI)	Endline (95% CI)	Baseline (95% CI)	Endline (95% CI)	Final Target
1. 1 To increase the number of varieties and volume of micronutrient rich foods (plant and animal sources) available year round for family consumption through HFP	Proportion of households with developed or improved HFP	8.2% (5.6-10.7)	34.4% (30-38.8)	11.5% (8.7-14.4)	59.7% (56.1-63.4)	-
	Mean number of MN-rich vegetable cultivated by HH each year	2.41	6.36	2	5.78	5
	Mean number of improved chickens owned per household	0	3.37	0	9.6	3
	Mean production (in kg) of MN-rich fruits and vegetables over 2-month period	19.4	22.3	45.4	156.9	60

<sup>7</sup> For all values the confidence interval calculated are at 95% confidence level

<sup>8</sup> In Bajura, project was only for 2 years with short intervention period, hence no targets were set

<sup>9</sup> NC: Not collected; ND: Not defined

1.2 To increase household income generated by women through HFP (and available for purchase of high value foods)	Percent of women with HFP generate income by selling garden and/or poultry products	13.9% (10.7-17)	46% (41.3-50.6)	<1% (0.11-1.8)	13.8% (6.9-20.6)	15%
	Percent of HHs purchasing animal source foods with income generated by sales of garden produce	4.9 % (2.9-6.8)	13.3% (10.1-16.4)	<1% (0.11-1.8)	0.6% (0.02-1.1)	15%

Result 2: To improve essential nutrition knowledge and practices						
Sub-results	Indicators	Bajura		Kailali		Final Target
		Baseline (95% CI)	Endline (95% CI)	Baseline (95% CI)	Endline (95% CI)	
2.1 To increase optimal breastfeeding feeding practices	Proportion of children born in past 24 months who were put to the breast within 1 hour of birth	41.7% (37.1-46.2)	81.1% (77.4-84.7)	59.9% (55.5-64.2)	79.1% (76-82.1)	75%
	Proportion of infants 0-5.9 months who received only breast milk during the previous day	73.7% (69.6-77.7)	78.3% (74.4-82.1)	79.1% (75.4-82.7)	82.9% (80.1-85.6)	80%
2.2 To improve the quality, diversity and quantity of complementary feeding of children 6-24 months	Proportion of children 6-24 months of age receiving foods from ≥4 food groups during the previous day <sup>10</sup>	35.7% (31.2-40.1)	69.1% (64.8-73.3)	20.8% (17.1-24.4)	78.3% (75.2-81.3)	31%
	Proportion of children 6-24 months of age receiving solid, semi-solid or soft foods the minimum number of times or more in the previous day <sup>11</sup>	59.3% (54.7-63.8)	84% (80.6-87.3)	<b>6-8 mos:</b> 39.6% (35.2-43.9) <b>9-23 mos:</b> 52.5% (48.1-56.9)	<b>6-8 mo</b> 62.5% (58.9-66.1) <b>9-23 mos:</b> 91.9% (89.8-93.9)	<b>6-8 mos:</b> 50% <b>9-23 mos:</b> 62.5%
	Proportion of children 6-24 who consumed iron-rich animal-source foods during previous 24 hour period	10.2% (4.7-12.9)	45.2%	15.2% (12-18.3)	25.6% (22.3-28.8)	30%
	Proportion of children 6-24 who consumed Vitamin A rich animal source food	50.9% (46.2-55.5)	76.2% (72.2-80.1)	5.2% (3.2-7.1)	32.4% (28.9-35.8)	20%
	Proportion of children 6-24 consumed iron rich plant source food	44.5% (39.9-49)	70.4% (66.1-746)	32.2% (28.0-36.3)	43.3% (39.6-46.9)	30%
	Proportion of children 6-24 consumed Vitamin A rich plant source food over previous 24 hour period	52.3% (47.6-56.9)	14.4% (11.1-17.6)	42.6% (38.1-47.0)	54.7% (51.0-58.3)	ND <sup>6</sup>
	Proportions of mothers or child caretakers washing hands at all four key occasions	8.9% (6.2-11.5)	53.6% (48.9-58.2)	<1% (0.1-1.8)	6.5% (4.6-8.3)	10%

<sup>10</sup> Out of seven groups: grains, roots & tubers; legumes & nuts; dairy products; flesh foods (meat, poultry fish, organ meats); eggs; Vitamin A-rich fruits and vegetables; other fruits and vegetables

<sup>11</sup> Defined as 2 times for breastfed infants 6-8.9 months and 3 times for breastfed children 9-23 months and includes meals and snacks

<b>Result 2: To improve essential nutrition knowledge and practices</b>						
<b>Sub-results</b>	<b>Indicators</b>	<b>Bajura</b>		<b>Kailali</b>		<b>Final Target</b>
		<b>Baseline (95% CI)</b>	<b>Endline (95% CI)</b>	<b>Baseline (95% CI)</b>	<b>Endline (95% CI)</b>	
2.3 To improve the nutritional care of sick children	Proportion of sick children receiving increased breastfeeding	20.9% (17.1-24.6)	62.1% (57.6-66.5)	37.3% (32.9-41.6)	46.8% (43.1-50.5)	57%
	Proportion of sick children 6-24 mos fed same or more during illness	42.1% (37.5-46.6)	46.8%	42.5% (38.1-46.9)	40.9% (37.2-44.5)	62%
	Proportion of sick children 6-24 months fed more after illness	31.7% (27.4-35.9)	48.7% (41.5-50.8)	32.9% (25.5-40.2)	28.2% (20.6-35.8)	ND <sup>6</sup>
	Proportion of children 6-24 months receiving homemade or ORT during most recent episode of diarrhea	30.5% (26.2-34.7)	53.9% (49.2-58.5)	11% (8.2-13.7)	66.8% (63.3-70.2)	28%
2.4 To improve dietary practices of pregnant and lactating women	Proportion of women eating more during pregnancy	25% (20.9-29)	83.8% (80.3-87.2)	10.6% (7.8-13.3)	66.7% (40.0-93.3)	20%
2.5 To increase postpartum vitamin A supplementation coverage	Proportion of mothers of children <24 months receiving VAS within 45 days of last delivery	55.4% (50.8-59.9)	84% (80.6-87.3)	69.4% (65.2-73.5)	90.1% (87.8-92.3)	85%
2.6 To sustain Vitamin A supplementation and de-worming coverage of children 6-59 months	Proportion of children 6-59 months receiving VAS every six months	87.6% (84.5-90.6)	92.1% (89.6-94.5)	86.6%	85.7% (83.1-88.3)	>85%
	Proportion of children 12-59 months receiving de-worming treatment every six months	87.4% (84.3-90.4)	93.1% (90.7-95.4)	65.4%	78.6% (75.5-81.6)	75%

**M&E Matrix: Baitadi OR District**

<b>Research Goal: To significantly reduce child malnutrition and related morbidity in intervention compared to control Ilakas of Baitadi<sup>12</sup></b>						
<b>Sub-Objective: To improve the nutritional status of children under 2 years and their mothers in the intervention compared to control Ilakas</b>						
Sub-objectives	Double-Difference Final targets/Indicators	Intervention area		Control area		DID <sup>13</sup>
		Baseline	Endline	Baseline	Endline	
1. To improve anthropometric status of children (assessed at age 12-48 months and women of reproductive age)	Reduction in stunting among children <b>12-48</b> months (height for age Z-score <-2 SD)10 percentage points greater in intervention compared to control Ilakas	-2.23 ± 1.14	-2.10 ± 1.28	-2.40 ± 1.14	-2.33 ± 1.26	0.93 (0.73-1.18)
	Reduction in wasting among children <b>12-48</b> months (weight for height Z-score <-2 SD)6 percentage points greater in intervention compared to control Ilakas	-0.91 ± 0.93	-0.85 ± 0.98	-0.93 ± 0.89	-0.71 ± 1.08	0.99 (0.68 - 1.45)
	Reduction in underweight among children <b>12-48</b> months (weight for age Z-score <-2 SD)2 percentage points greater in intervention compared to control Ilakas	1.87 ± 0.99	-1.77 ± 1.00	-1.97 ± 0.94	-1.77 ± 1.04	1.13 (0.89 - 1.43)
	Reduction in underweight among women of reproductive age (BMI <18.5 kg/m <sup>2</sup> )	28.2 (25.3 - 31.1)	26.6 (24.0 - 29.1)	17.5 (15.0 - 20.0)	23.0 (20.6 - 25.4)	0.65 (0.49 - 0.87)*
2. To decrease anemia levels in children 6-24 months and pregnant and lactating women	Reduction in prevalence (%) of anemia among children <b>12-48</b> months significantly greater in intervention compared to control Ilakas (target: 15 percentage points difference) defined as Hb concentration <110g/dL adjusted for altitude	28.2 (25.4 - 30.9)	30.8 (28.3 - 33.3)	31.6 (28.8 - 34.4)	42.5 (39.9 - 45.2)	0.77 (0.60 - 1.00)#
	Reduction in prevalence of anemia in non-pregnant women of reproductive age (Hb<11 g/dl) significantly greater in intervention compared to control Ilakas (target: 5 percentage points difference)	19.4 (16.9 - 21.9)	24.3 (21.8 - 26.7)	20.9 (18.2 - 23.5)	36.0 (33.2 - 38.7)	0.59 (0.45 - 0.76)*
	Increase in proportion of women who reported taking any iron supplements in previous pregnancy (target: 20 percentage difference)	72.2 (69.5 - 74.9)	92.3 (90.9 - 93.8)	77.3 (74.7 - 79.8)	85.4 (83.5 - 87.3)	2.70 (1.95 - 3.73)*

<sup>12</sup> For all values the confidence interval calculated are at 95% confidence level. Age of the children selected for survey was 12-47 months.

<sup>13</sup> Adjusted logistic regression testing for difference in differences and controlling for: number of children in HH; male-headed HH; caste (high/low); respondent employed outside home; mother's education (some/none); mother as primary caretaker (y/n) (child outcome only); child's age and sex (child outcome only); mother's age (WRA outcome only).

\*P<0.05; # P<0.051



<b>Result 1: To increase the availability of micronutrient-rich foods year round for consumption by children under 2 years, pregnant and lactating women in intervention compared to control Ilakas</b>						
Sub-results	Double-Difference Final targets/Indicators	Intervention area		Control area		DID
		Baseline	Endline	Baseline	Endline	
1.1 To increase the number of varieties and volume of micronutrient rich foods (plant and animal sources) available year round for family consumption through HFP	Increase in proportion of households with developed or improved HFP significantly greater in intervention compared to control Ilakas	<b>1.3</b> <b>(0.2 - 2.4)</b>	<b>60.0</b> <b>(57.3 - 62.7)</b>	<b>0.7</b> <b>(-0.1 - 1.5)</b>	<b>2.1</b> <b>(1.2 - 3.0)</b>	<b>37.8</b> <b>(8.38 - 170.2)*</b>
	Increase in median number of MN-rich vegetable cultivated by HH each year significantly greater in intervention compared to control Ilakas	<b>4.0 ± 2.0</b>	<b>8.0 ± 4.0</b>	<b>4.0 ± 2.0</b>	<b>4.0 ± 2.0</b>	<b>1.80</b> <b>(1.69 - 1.92)*</b>
	Increase in <b>proportion of households with poultry production</b> significantly greater in intervention compared to control Ilakas	<b>11.9</b> <b>(10.0 - 13.9)</b>	<b>29.5</b> <b>(27.0 - 31.9)</b>	<b>14.7</b> <b>(12.5 - 16.8)</b>	<b>16.7</b> <b>(14.7 - 18.7)</b>	<b>2.64</b> <b>(1.93 - 3.62)*</b>
	Increase in median production (in kg) of MN-rich fruits and vegetables over 2-month period significantly greater in intervention compared to control Ilakas significantly greater in intervention compared to control Ilakas	<b>10.0 ± 15.5</b>	<b>30.0 ± 30.0</b>	<b>10.0 ± 15.5</b>	<b>13.0 10.0 ± 12.0</b>	<b>2.24</b> <b>(1.97 - 2.54)*</b>
1.2 To increase household income generated by women through HFP	Increase in proportion of women with HFP generating income by selling garden and/or poultry products significantly greater in intervention compared to control Ilakas	8.4% (6.7-10.1)	15.3% (13.3-17.3)	6.6% (5.1-8.1)	6.8% (5.4-8.2)	<b>NC</b>
	Number and percent of HHs purchasing animal source foods with income generated by sales of garden produce	0	8.0% (3.0-13.0)	0	10% (-0.7-20.7)	<b>NC</b>

Result 2: To improve essential nutrition knowledge and practices in intervention compared to control llakas						
Sub-results	Double-Difference Final targets/Indicators	Intervention area		Control area		DID <sup>14</sup>
		Baseline	Endline	Baseline	Endline	
2.1 To increase optimal breastfeeding feeding practices	Increase in proportion of children born in past 24 months who were put to the breast within 1 hour of birth significantly greater in intervention compared to control llakas (target: 10 percentage points difference)	59.2 (54.2 - 64.2)	52.2 (47.3 - 57.0)	50.4 (45.3 - 55.5)	37.5 (33.3 - 41.6)	NC
	Increase in proportion of infants 0-5.9 months who received only breast milk during the previous day significantly greater in intervention compared to control llakas (target: 10 percentage points difference)	62.5 (53.0 - 72.0)	76.7 (68.4 - 85.0)	61.6 (51.9 - 71.4)	63.0 (54.5 - 71.5)	1.86 (0.83 - 4.20)
2.2 To improve the quality, diversity and quantity of complementary feeding of children 12-23 months	Increase in proportion of children 12-23 months of age receiving foods from ≥4 food groups <sup>15</sup> during the previous day significantly greater in intervention compared to control llakas (target: 10 percentage points difference)	41.5 (36.5 - 46.5)	82.0 (78.3 - 85.8)	42.2 (37.2 - 47.2)	46.9 (42.6 - 51.2)	5.33 (3.50 - 8.11)*
	Increase in proportion of children 12-23 months of age receiving solid, semi-solid or soft foods the minimum number of times <sup>16</sup> or more in the previous day significantly greater in intervention compared to control llakas (target: 10 percentage points difference)	83.8 (80.1 - 87.6)	96.4 (94.5 - 98.2)	87.3 (84.0 - 90.7)	91.5 (89.1 - 93.9)	NC
	Increase in proportion of children 12-23 who consumed <b>animal flesh foods</b> during previous 24 hour period significantly greater in intervention compared to control llakas (target: 20 percentage points difference)	4.6 (2.4 - 6.7)	5.6 (3.4 - 7.8)	4.2 (2.2 - 6.3)	4.3 (2.6 - 6.1)	NC
	Increase in proportion of children 12-23 who consumed <b>eggs</b> significantly greater in intervention compared to control llakas	2.7 (1.0 - 4.4)	14.6 (11.1 - 18.0)	1.6 (0.3 - 2.8)	2.4 (1.1 - 3.8)	3.94 (1.20 - 13.0)*
	Increase in proportion of children 12-23 consumed iron rich plant source food ( <b>legumes</b> ) significantly greater in intervention compared to control llakas (target: 20 percentage points)	55.5 (50.4 - 60.6)	90.3 (87.4 - 93.2)	54.1 (49.0 - 59.1)	62.7 (58.6 - 66.8)	5.22 (3.26 - 8.34)*
	Increase in proportion of children 12-23 consumed Vitamin A rich plant source food over previous 24 hour period significantly greater in intervention compared to control llakas (target: 20 percentage points difference)	63.1 (58.1 - 68.0)	93.0 (90.5 - 95.4)	66.0 (61.2 - 70.8)	68.4 (64.4 - 72.3)	6.94 (4.14 - 11.16)*

<sup>14</sup> Difference in differences unadjusted; \* P<0.05; NC=Not calculated

<sup>15</sup> Out of seven groups: grains, roots & tubers; legumes & nuts; dairy products; flesh foods (meat, poultry fish, organ meats); eggs; Vitamin A-rich fruits and vegetables; other fruits and vegetables

<sup>16</sup> Defined as 2 times for breastfed infants 6-8.9 months and 3 times for breastfed children 9-23 months and includes meals and snacks

<b>Result 2: To improve essential nutrition knowledge and practices in intervention compared to control llakas</b>						
<b>Sub-results</b>	<b>Double-Difference Final targets/Indicators</b>	<b>Intervention area</b>		<b>Control area</b>		<b>DID<sup>14</sup></b>
		<b>Baseline</b>	<b>Endline</b>	<b>Baseline</b>	<b>Endline</b>	
	Increase in proportions of mothers or child caretakers washing hands at all four key occasions significantly greater in intervention compared to control llakas (target: 20 percentage points difference)	0	11.3 (9.6 - 13.0)	0	0.9 (0.4 - 1.4)	NC
2.3 To improve the nutritional care of sick children	Increase in proportion of sick children receiving increased breastfeeding significantly greater in intervention compared to control llakas (target: 20 percentage points)	<b>16.7</b> <b>(0.6 - 32.7)</b>	<b>74.5</b> <b>(61.5 - 87.4)</b>	<b>19.6</b> <b>(7.7 - 31.5)</b>	<b>44.3</b> <b>(32.4 - 56.2)</b>	<b>4.46</b> <b>(0.97 - 20.57)*</b>
	Increase in proportion of sick children 12-23 months fed same or more during illness significantly greater in intervention compared to control llakas	<b>31.8</b> <b>(10.7 - 53.0)</b>	<b>46.8</b> <b>(32.0 - 61.6)</b>	<b>39.6</b> <b>(24.3 - 54.8)</b>	<b>40.5</b> <b>(29.1 - 52.0)</b>	NC
	Increase in proportion of sick children 12-23 months fed more after illness significantly greater in intervention compared to control llakas	NA	34.4% (27.8-41.0) (12-23 mos.)	NA	11.4% (8.1-14.7) (12-23 mos.)	NC
	Increase in proportion of children 12-23 months receiving homemade or ORT during most recent episode of diarrhea significantly greater in intervention compared to control llakas (target: 10 percentage points difference)	51.1% (36.5-65.7) (12-23 mos.)	77% (69.5-84.5) (12-23 mos.)	46.3% (35.4-57.2) (12-23 mos.)	70.1% (65.0-75.2) (12-23 mos.)	NC
2.4 To improve dietary practices of pregnant and lactating women	Increase in proportion of women eating more during pregnancy significantly greater in intervention compared to control llakas (target: 10 percentage points difference)	15% (8.0-22.0)	40% (31.4-48.6)	10.9% (5.5-16.3)	9.4% (4.3-14.5)	<b>4.45</b> <b>(1.56 - 12.63)*</b>
2.5 To increase postpartum vitamin A supplementation coverage of women	Increase in proportion of mothers of children <24 months receiving VAS within 42 days of last delivery significantly greater in intervention compared to control llakas (target: 15 percentage points difference)	<b>35.5</b> <b>(32.7 - 38.4)</b>	<b>80.3</b> <b>(78.2 - 82.5)</b>	<b>41.4</b> <b>(38.4 - 44.4)</b>	<b>63.1</b> <b>(60.5 - 65.7)</b>	<b>3.06</b> <b>(2.38 - 3.92)*</b>
2.6 To sustain Vitamin A supplementation and de-worming coverage of children 6-59 months	Proportion of children 12-59 months receiving VAS every six months sustained at >85%	<b>93.6</b> <b>(92.2 - 95.1)</b>	<b>98.0</b> <b>(97.3 - 98.8)</b>	<b>95.3</b> <b>(94.1 - 96.6)</b>	<b>95.6</b> <b>(94.5 - 96.7)</b>	NC
	Proportion of children 12-59 months receiving de-worming treatment every six months increased by 10 percentage points.	<b>85.5</b> <b>(83.4 - 87.6)</b>	<b>94.8</b> <b>(93.6 - 96.0)</b>	<b>90.6</b> <b>(88.8 - 92.3)</b>	<b>92.8</b> <b>(91.4 - 94.2)</b>	<b>2.30</b> <b>(1.51 - 3.50)*</b>

<b>Result 3: To increase the capacity of health, agriculture, NGO and community agents to promote improved nutrition and agricultural practices</b>			
<b>Sub-results</b>	<b>Final Targets/Indicators</b>	<b>Baseline</b>	<b>Endline</b>
3.1 To strengthen the capacity of district health and agricultural staff, NGO staff, FCHVs and members of Mothers Groups to promote optimal nutrition practices	Number of people trained in ENA BCC by type (e.g. district health and agricultural staff, FCHV supervisors, FCHVs, members of mothers groups) ENA/BCC MTOT: 25 master trainers ENA/BCC TOT ENA training VMF/FCHVs: 40 FCHVs ENA training HFPBs	0	24 Master Trainers 8 trainers 318 VMF/FCHVs 3029 HFPBs
3.2 To strengthen the capacity of local NGOs, district agricultural staff and selected FCHVs to establish and maintain Village Model Farms (VMFs)	Number of local NGO and district agricultural staff trained in HFP (target: 25) HFP MTOT and TOT HFP VMF training (target: 120) HFP HFPB training Number of VMFs including poultry (target: 120) Number of VMFs including improved or developed garden (target: 120)	0	12 Master trainers 8 trainers 122 VMFs 3329 HFPBs 122 VMFs 122 VMFs
3.3 To develop the capacity of members of HFPBs to undertake HFP	Number of Mothers Groups established around VMFs Number of Mothers Groups members given training in HFP	0	179 179
3.5 To strengthen the decision making role of women over use of HFP income	Percent of women with home gardens/poultry having major control of decisions on the utilization of income generated from <b>poultry sales</b>	32.4	59.3

<b>Result 4: To share results of operations research with decision-makers in Nepal and internationally in order to catalyze replication of model</b>			
<b>Sub-results</b>	<b>Final Targets/Indicators</b>	<b>Baseline</b>	<b>Endline</b>
4.1 To keep national policy makers in charge of food security, agriculture and health programs aware and informed of the progress and results of OR	At least 3 meetings held each year (every 4 months) with national level stakeholders to report on progress and share results  At least 3 meetings held each year (every 4 months) with district level stakeholders to report on progress and share results	0	every month  every month
4.2 Data collected for operations research analyzed, submitted for publication, and disseminated widely	-- Research findings shared with all relevant stakeholders within Nepal -- At least 3 peer review publications in process by LOP --At least 2 presentation of research progress/findings at international conferences by LOP	0	2 articles submitted 2 presentations

## Annex 7. CHW Training Matrix

Project Area	Type of CHW	Official government CHW or AAMA	Paid or Volunteer	Number Trained over life of project	Focus of Training
Kailali District	FCHV (Female Community Health Volunteer)	Government	Volunteer	1012 (among these, 95 FCHV are also VMF)	ENA/BCC: IYCF, Breastfeeding, Women nutrition, Care of sick child, Counseling
"	VMF (Village Model Farmer)	AAMA	Volunteer	31 VMF	ENA/BCC: IYCF, Breastfeeding, maternal nutrition, care of sick child, Counseling
"	HFPBs	AAMA	Volunteer	4417 HFPBs	ENA/BCC: IYCF, Breastfeeding, maternal nutrition, care of sick child
"	VMF/FCHV (Village Model Farm)	AAMA	Volunteer	126	HFP: Planting, Compost, Pest management (IPM), Poultry raising
"	HFPBs	AAMA	Volunteer	4632	HFP: Planting, Compost, IPM, Poultry raising
"	VMF	AAMA	Volunteer	123	Group facilitation skills
"	VMF	AAMA	Volunteer	15	Group Marketing
"	HFPBs	AAMA	Volunteer	2	Group Marketing
Baitadi District	FCHV	Government	Volunteer	230 (among this 34 FCHV are also VMF)	ENA/BCC: IYCF, Breastfeeding, Women nutrition, Care of sick child, Counseling
"	VMF (Village Model Farm)	AAMA	Volunteer	88 VMF	ENA/BCC: IYCF, Breastfeeding, maternal nutrition, care of sick child, Counseling
"	HFPBs	AAMA	Volunteer	3029	ENA/BCC: IYCF, Breastfeeding, maternal nutrition, care of sick child
"	VMF/FCHV (Village Model Farm)	AAMA	Volunteer	122	HFP: Planting, Compost, Pest management (IPM), Poultry raising
"	HFPBs	AAMA	Volunteer	3329	HFP: Planting, Compost, IPM, Poultry raising
"	FCHV	Government	Volunteer	76	IYCF and MNP
"	VMF	AAMA	Volunteer	110	Group facilitation skills
"	HFPBs	AAMA	Volunteer	13	Refresher training on ENA
Bajura District	FCHV	Government	Volunteer	261 (among this 122 FCHV are also VMF)	ENA/BCC: IYCF, Breastfeeding, Women nutrition, Care of sick child, Counseling
"	VMF	AAMA	Volunteer	12	ENA/BCC: IYCF, Breastfeeding, maternal nutrition, care of sick child, Counseling
"	HFPBs	AAMA	Volunteer	3412	ENA/BCC: IYCF, Breastfeeding, maternal nutrition, care of sick child
"	VMF/FCHV	AAMA	Volunteer	133	HFP: Planting, Compost, Pest management (IPM), Poultry raising
"	HFPBs	AAMA	Volunteer	3412	HFP: Planting, Compost, IPM, Poultry raising
Total				13007	

## Annex 8. Evaluation Team Members

1. Judiann McNulty, consultant, Team Leader
2. Jennifer Nielsen, Senior Program Manager for Nutrition and Health, HKI New York
3. Dale Davis, HKI Country Director Nepal
4. Pooja Pandey Rana, Director of Program
5. Madhukar Shrestha, Senior Program Manager
6. Ram Kumar Neupane, Homestead Food Security Manager
7. Sabina Hora, BCC Nutrition Specialist
8. Nisha Sharma, M&E Officer
9. Dr. Shiv Adhikari, Consultant
10. Colleen Andrews, Columbia University Intern
11. Bhim Neure, Cluster Agriculture Coordinator
12. Harendra Bahadur Chand, Regional Governance Manager
13. Nabaraj Upreti, District Coordinator
14. Ratanpati Joshi, Program Assistant
15. Bhupendra Thapa, Livestock Officer, DLSO

## Annex 9. Evaluation Assessment Methodology

### SCOPE OF WORK - Nepal AAMA Final Evaluation Team Leader

#### I. Introduction

Nepal has made considerable progress in reducing child and maternal mortality, but has had less success improving nutritional status. Problems are more severe in the remote Far Western Region. According to the findings of 2006 Demographic & Health Survey (DHS 2006), stunting (low height for age-HA) or evidence of chronic malnutrition among children under five is 52 percent in the FWR; wasting (low weight for height-WH) or evidence of recent severe malnutrition is an alarming 16.7 percent; and the composite measure underweight (low weight for age-WA) is estimated for the region at 44 percent. Anemia prevalence is extremely high among both women of reproductive age and young children, at over 50 percent. It is well documented that undernutrition increases mortality and reduces cognitive and human potential and the economic status of households and nations<sup>17</sup>. It is also clear that the damage from poor nutrition during gestation and the first two years of life are largely irreversible<sup>18</sup>, and that early prevention has lasting and compounding benefits<sup>19</sup>.

#### II. Project Background

The **Action Against Malnutrition through Agriculture** project (AAMA, or mother in Nepali) targeted pregnant and lactating women and children less than two years of age in three FWR districts, Kailali and Baitadi and later in Bajura. Helen Keller International (HKI) and its national partner Nepali Technical Assistance Group (NTAG) and local partners Nepal National Social Welfare Association (NNSWA - Kailali), *Snehi Mahila Jagaron Kendra* (SMJK - Baitadi) and Women Development Forum (Bajura) collaborated on an **innovation** that merged two proven programs addressing complementary and critical facets of malnutrition in Nepal and throughout the developing world: food security and nutrition knowledge and practices. To address the first, the project used HKI's signature Homestead Food Production (HFP) program, which has been bringing appropriate technologies for improved household food enrichment and diversification for almost 20 years in South Asia and for over 10 years in Nepal. This approach, establishing demonstration village model farms (VMFs) that provide technical support and inputs to affiliated beneficiary households to enable them to set up "developed" home gardens, has demonstrated positive impact on household food production, consumption and micronutrient status, as well as on women's economic and social empowerment<sup>20</sup>. The second element, Essential Nutrition Actions (ENA), encompasses interventions targeting the key knowledge and behaviors with proven impact on nutritional practices<sup>21</sup> and on related undernutrition and mortality<sup>22</sup>.

<sup>17</sup> Victora CG et al. *Maternal and child undernutrition: consequences for adult health and human capital*. 2008 Lancet (371):340-57

<sup>18</sup> World Bank, *Repositioning Nutrition as Central to Development: A strategy for large-scale action*. 2006; Washington, DC.

<sup>19</sup> Black RE, Allen LH, Bhutta ZA, Caulfield LE et al. 2008 *Maternal and child undernutrition: global and regional exposures and health consequences*. Lancet;371:243-60.

<sup>20</sup> Helen Keller International Nutrition Bulletins for Nepal (May 2001; July 2004), Bangladesh (Sept 2003; Nov 2004) and Cambodia (May 2004; December 2006). Copies will be submitted as annexes to this report.

<sup>21</sup> Guyon A, Quinn V, Rambeloson Z and Hainsworth M. 2006. *Final Report: Using the ENA approach to improve nutritional practices of women and children at scale in Antananarivo and Fianarantsoa provinces of Madagascar*. Linkages Project. *Successful community nutrition programming: Lessons from Kenya, Tanzania and Uganda*. 2002; Linkages Project. *Integrated Nutrition and Health Project (INHP-II)*. 2002. CARE/India.

<sup>22</sup> Bhutta ZA, Ahmed T, Black RE, Cousens S et al. 2008. *What works? Interventions for maternal and child undernutrition and survival*. Lancet;371:417-40

Over four years (October 1, 2008-September 30, 2012) the project will reach a total target population in Kailali of 149,280 women of reproductive age and 28,959 children under two with the ENA interventions, and all children under five, or an additional 60,790 with HFP (total beneficiaries in Kailali 239,029). In Baitadi's four intervention Ilakas, AAMA will reach a total of 20,300 women of reproductive age and 5,120 children under two with ENA and an additional 6,880 children 24-59 months with HFP.

The innovation was also designed to reinforce and strengthen Nepal's highly successful Female Community Health Volunteer (FCHV) program. Training intended to expand their skills in nutritional counseling while the VMFs provided a platform to facilitate and reinforce their education and outreach efforts. FCHVs, many of whom are also village model farmers, have used the VMFs as a meeting place for nutrition education discussions with the homestead food production beneficiaries (HFPBs). In turn, the HFPBs were asked to reinforce the FCHV efforts by conveying key ENA messages to their wider communities. By providing a platform for mothers group meetings and engaging HFPBs in supporting the behavior change communications, the project intended to reduce the burden on FCHVs. Also, HKI's prior experience with HFP suggests that other household members will help provide the labor, and that, by developing production close to the household, the system reduces the burden of the traditional practice of tending to distant plots.

In the Kailali district the project used an adequacy assessment (comparing baseline to end line measures on a spectrum of nutrition, hygiene, food security and food production indicators) of project impact<sup>23</sup> and create a district-wide model that can be replicated elsewhere. This model attempted to improve food security and nutrition knowledge and practices for the entire population of the district, although direct participants were HFP were only around 15 percent of the population. In the Baitadi district the intervention was implemented as a randomized community effectiveness trial. Intervention sites (Ilakas, or sub-regions) were be randomly selected and matched with control sites on economic, health and food security indicators. Baseline and end line measures of both arms were compared (double-difference estimates) to allow for probability assessment of the impact of the intervention on child and maternal nutritional status, household nutritional practices and food production. In this model, the project intended to improve food security and nutrition practices for the entire population of the intervention Ilakas while actively involving approximately 40 percent of the populations in these areas.

## A. Scope of Work

- Purpose** : To perform the final evaluation of the Nepal AAMA Child Survival Project, GHS-A-00-08-00001-00
- Dates** : This consultancy will be performed between approximately September 1 and October 30, 2012. The final evaluation team leader will work a total of 25 days and will arrive in Kathmandu on September 13 and depart on September 29, performing most of the data collection work in the target areas of Kailali and Baitadi. The work-plan given below will be revised if necessary, based on the field situation in consultation with the evaluation team.

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<sup>23</sup>Baseline data have been collected from a district that was to serve as a control for a plausibility assessment, the neighboring Terai district of Bardia, but subsequent government plans to roll out a community-based management of acute malnutrition project across that district may confound comparisons.



**Product** : The product of this work is a written document (can be submitted in electronic format) the body of which does not exceed 40 pages with all annexes in English following the format given in USAID’s Final Evaluation Guidelines, May, 2012. A draft report shall be submitted by October 15, 2012. The final document incorporating suggestions and inputs from the Nepal and US teams of HKI shall be finalized by October 26, 2012.

## **B. Methodology**

As stated in USAID’s *Guidelines for Final Evaluation*, “the final evaluation provides an opportunity for all project stakeholders to take stock of accomplishments to date and to listen to the beneficiaries at all levels, including mothers and caregivers, other community members and opinion leaders, health workers, health system administrators, local partners, other organizations, and donors”.

The evaluation objectives are to determine the extent to which the project has achieved its results in accordance with the Detailed Implementation Plan (DIP), to describe what has and hasn’t worked, so that the learning can inform future projects and to demonstrate how the project has contributed to the global knowledge-base on integrated agriculture and nutrition programming and its impact on the nutritional status of pregnant and breastfeeding women and children under two years of age.

The AAMA evaluation should involve project stakeholders and beneficiaries in order to gain their perspective on what has worked and the challenges they encountered. In Nepal these include the staff of HKI and its partner NGOs (NTAG, SMJK and NNSWA), FCHVs, HFPBs, health and agriculture extension workers and administrators, other community members, opinion leaders, partners and other organizations that work in the same area, and donors. The USAID/Nepal mission is also a critical partner.

The Team Leader will select the most appropriate methods for data collection and analysis, which may include focus group discussions or group interviews, key informant in-depth interviews with stakeholders, observations of field activities, and shall include review of all relevant project documents, project monitoring data and reports, and Ministry of Health information systems.

USAID’s guidance defines the key activities of the final evaluation as follows:

- Review project documents prior to travel to the country
- Travel time to the country and to the project site
- Team planning meetings with key PVO and partner staff to explain the purpose of the evaluation, and with the evaluation team to organize specific activities
- Field work and data collection: site visits and interviews (key informants and/or focus groups)
- Data analysis and additional interviews
- In-country debriefing preparation and presentation
- Travel out of the country
- Drafting and finalizing report.

Observations if feasible will be made of the following activities: Village Model and household farms, ENA counseling sessions held at VMFs by FCHVs, and other project activities.

The documents review will include: DIP, Annual Reports, baseline and endline survey reports, BCC and training materials developed for the project and other project reports.

### Composition of Evaluation Team

The evaluation team shall be made up of approximately 10 persons, divided into 2 teams and shall be made up of:

1. An external consultant approved by USAID who will be the team leader (1)
2. MOH Central/Provincial/District Level staff (2-3)
3. AAMA project staff (6-8)
4. HKI Headquarters backstop (1)
5. NGO partner representatives (2-3)
6. Drivers (2)

A representative of the USAID mission will also be invited to join the team. The team leader is responsible for coordinating all evaluation activities, supervising the team and overseeing field data collection, meeting all specified objectives, collaborating with HKI, USAID, and submitting a draft and a final report according to the defined timeline.

### C. Estimated Work Schedule

# of days	Task Description	Location of work
2	Familiarization with project documents	US
2	Travel to Kathmandu/FWR	Transit
3	Team planning meeting, development of tools, pre-testing	Kathmandu/Kailali
3	Data collection from randomly selected project villages	Kailali & Baitadi
2	Data analysis and synthesis	Kailali
1	Preparation of presentation to stakeholders; presentation of preliminary finding	Kailali
1	Travel to Kathmandu	Transit
1	Briefing for USAID and MOH	Kathmandu
2	Depart for US	Transit
6	Report Writing	US
2	Finalize report	US

### D. Deliverables

The final evaluation report shall address each of the relevant elements outlined in USAID’s guidelines. Of particular interest is:

- The extent to which the ENA and HFP elements are successfully integrated and how this might be strengthened (for example, Have agriculture staff understood the ENA messages and are they promoting them? Are the FHCVs who are not VMF owners using

the VMFs as a platform for nutrition BCC? Was the HFP and ENA training phased in sufficiently to allow absorption of the many technical topics and skills?)

- The strength of linkages achieved between VMFs and HFPBs (household producers) and whether the ties could be further strengthened.
- The extent to which BCC techniques have been mastered and are practiced effectively by those responsible for promoting ENA, and the responses of target mothers to these techniques regarding such key actions as exclusive breastfeeding, enriching complementary foods for children 6-12 months with eggs and other animal-source foods, and hand washing.
- The impact of the program on FCHV motivation and whether involvement in HFP is indeed a mechanism for improving retention and commitment of FCHVs to their health work.

## Annex 10. List of Persons Interviewed

<b>Kailali</b>	<b>Baitadi</b>
<p><b>VMFs interviewed:</b></p> <ol style="list-style-type: none"> <li>1. Rita Chaudhary, Durgauli</li> <li>2. Urmila Chaudhary, Munuwa</li> <li>3. Laxmi Chaudhary, Masuriya</li> <li>4. Sita Rana, Urma</li> <li>5. Basanti Chaudhary, Kotatulsipur</li> <li>6. Sona Chadhary, Geta</li> <li>7. Sagunawati Rana, Beladevipur</li> <li>8. Jokhani Chaudhary, Janakinagar</li> <li>9. Sarita Chaudhary, Udasipur</li> <li>10. Shakuntala Chaudahry, Chaumala</li> </ol>	<p><b>VMF interviewed:</b></p> <ol style="list-style-type: none"> <li>1. Parbati Bohora, Gurukhola</li> <li>2. Manju Bohora, Dehimandu</li> <li>3. Rajmati Mahara, Bhumeshowre</li> <li>4. Manju Mahara, Bhumeswore</li> <li>5. Tulsi Chand, Basuling</li> <li>6. Ratna Chand, Nwali</li> <li>7. Dhanmaya Thagunna, Nwali</li> <li>8. Geeta Chand, Bhauneli</li> <li>9. Devaki Joshi, Gwallek</li> <li>10. Yashoda Bhandari, Patan</li> </ol>
<p><b>HFPBs group interview:</b></p> <ol style="list-style-type: none"> <li>1. Munuwa: Seven HFPBs</li> <li>2. Urma: Ten HFPBs</li> <li>3. Kotatulsipur: Ten HFPBs</li> <li>4. Masuriya: Nine HFPBs</li> <li>5. Geta: Thirteen HFPBs</li> <li>6. Beladevipur: Ten HFPBs</li> <li>7. Janakinagar: Eight HFPBs</li> <li>8. Udasipur: Eight HFPBs</li> <li>9. Chaumala: Seven HFPBs</li> </ol>	<p><b>HFPBs group interview:</b></p> <ol style="list-style-type: none"> <li>1. Dehimandu: 16 HFPBs</li> <li>2. Bhumeswore: 12 HFPBs</li> <li>3. Basuling: 7 HFPBs</li> <li>4. Nwali: 13 HFPBs</li> <li>5. Gwallek: 6 HFPBs</li> <li>6. Patan: 7 HFPBs</li> </ol>

<p><b>Government staffs interviewed:</b></p> <ol style="list-style-type: none"> <li>1. Dr. Binod Kattel, Senior Veterinary Officer, DLSO</li> <li>2. Mr. Khagendra Prasad Sharma, Senior Agriculture Development Officer</li> <li>3. Mr. Jaya Bahadur Karki, Senior Public Health Administrator, District Public Health Office</li> <li>4. Mr. Gokarna Prasad Sharma, Local development Officer, District Development Committee</li> <li>5. Bhupendra Thapa, Livestock Officer, DLSO (also involved in field visit)</li> <li>6. Jeet Bahadur Malla, VDC secretary, Kotatulsipur VDC</li> <li>7. Purna Bazagain, VDC secretary, Janakinagar VDC</li> <li>8. Khadga Singh Chaudhary, Urma-1, VDC accountant</li> <li>9. Mr. Keshab Bhatta, Chaumala, VDC secretary</li> </ol>	<p><b>Government staffs interviewed:</b></p> <ol style="list-style-type: none"> <li>1. Dr. Guna Raj Awsasthi, District Health Office</li> <li>2. Bhuwan Raj Joshi, Former Nutrition Focal person, District Health Office</li> <li>3. Karna Bahadur Chand, Planning officer, DADO</li> <li>4. Khem Raj Bhatta, Junior Technician, DLSO</li> <li>5. Aatma Ram Bhatta, Junior Technician, DLSO</li> <li>6. Hajari Air, ANM, Bhauneli SHP</li> <li>7. Damber Datta Pandey, VDC secretary, Dehimandu/Durgasthan VDC</li> <li>8. Nabin Chandra Pandey, Social Development Officer, DDC</li> </ol>
<p><b>Suahara staff attending the synthesis workshop:</b></p> <ol style="list-style-type: none"> <li>1. Badri Paudel, Cluster Senior Program Coordinator</li> <li>2. Sharad Basnet, Cluster Health System Coordinator</li> <li>3. Ishwor Sharma, EHA Cluster Officer</li> <li>4. Rajeev Banjara, Cluster M&amp;E Coordinator</li> </ol>	<p><b>HFPBs individual interview:</b></p> <ol style="list-style-type: none"> <li>1. Bhumeswore: 1</li> <li>2. Bhauneli: 4</li> <li>3. Gwallek: 1</li> <li>4. Srikedar: 4</li> </ol>

## Annex 11. Final OR Report

### Executive Summary

**Background and objectives:** Under a four-year child survival grant from USAID, HKI conducted a community randomized effectiveness trial to test whether its enhanced homestead food production model (EHFP) could reduce rates of stunting, wasting, underweight and anemia in target groups. EHFP combines nutrition-sensitive agriculture production strategies targeted at women to increase year-round access to nutrient dense plant and animal source foods with behavior change communications to reinforce optimal nutrition practices for women and children from 0 to 23 months of age. The research was implemented in the hilly Baitadi district of Nepal’s far western region.

**Methods:** Four Ilakas (sub-districts) were randomly assigned to the treatment arm (EHFP) and four to the control arm (no intervention). Each “Ilaka” is further divided into an average of 5 village development councils (VDC), and each VDC consists of nine wards. The intervention created one village model farm (VMF) in six randomly selected wards in each of the selected VDCs, to reach 40 HFP beneficiaries (HFPBs) and their households in each ward and to achieve the maximum spillover to the entire population of the treatment VDCs. The study used a cross-sectional design, and assessed children ages 12-48 months on the presumption that this would best be able to capture the impact of the intervention on children who would be exposed during the -9 to 23 month nutritional “critical window.” A stratified, three stage, probability proportional to size (PPS) survey methodology was used to select households for inclusion in the baseline and endline surveys. Data were collected on household socioeconomic characteristics, homestead food production practices, nutrition and health knowledge and practices, maternal and child anthropometry and hemoglobin concentration. In addition to baseline and endline surveys, four rounds of data collected using LQAS methodologies, twice yearly over two years of implementation, were used to monitor the quality of project implementation.

**Results:** Data were available for n=2106 children at baseline (n=1055 treatment; n=1051 control) and for n=2614 at endline (n=1307 treatment; n=1307 control). Logistic regression showed significant improvements in treatment compared to control communities along all aspects of the program impact pathways, including household food production, perceptions of food security, nutrition knowledge, receipt of reproductive health care, and complementary feeding practices. Children 12-23 months were more likely fed a minimum acceptable diet [OR 5.36 (3.53 – 8.14); p<0.05] and/or eggs [OR 3.94 (1.20 – 13.0); p<0.95]]. No significant changes were found in adjusted logistical regression analysis on measures of child anthropometry; for stunting the AOR was 0.93 (0.73 – 1.18). Borderline significant reductions were found in adjusted analysis of child anemia [AOR 0.77 (0.60-1.00; p=0.051)]. On the other hand, significant reductions were detected in women’s underweight (BMI<18.5 kg/m<sup>2</sup>), AOR 0.63 (0.47-0.84; p<0.05), and in women’s anemia, AOR (0.59-0.76; p<0.05).

**Conclusions:** The EHFP model may not be sufficient to reverse stunting in settings with extremely high prevalence, but does appear to contribute significantly to women’s improved nutritional status. Further research is needed to determine if a longer exposure period could positively influence child growth or if the EHFP in combination with a reinforced strategy to reduce and treat infections could have stronger impact and to explore if the model, which aims to empower women, also contributes to their nutritional gains.

## 1. Introduction and Key Research Question

Helen Keller International (HKI) has been implementing its homestead food production (HFP) program for over 20 years to increase household production of micronutrient-rich foods and improve food security and diet quality among vulnerable households. The HFP strategy establishes village model farms (VMFs) to demonstrate improved gardening techniques to affiliated groups of mothers; these techniques support more diversified, year round production of micronutrient-rich crops as well as improved breeds of poultry and ruminants. The enhanced HFP program (EHFP) includes nutrition behavior change communications using the Essential Nutrition Actions (ENA) framework to encourage consumption of these nutrient rich products, especially among vulnerable household members such as pregnant and lactating women and infants and young children<sup>24</sup>. The ENA framework focuses on seven fundamental interventions (support for optimal breastfeeding, complementary feeding, and nutritional care of the sick child; maternal nutrition, integrated control of anemia and control of vitamin A and iodine deficiencies) with demonstrated impact on child survival (1). The intersectoral approach of EHFP has been shown to increase the number of developed gardens, the quantity, quality and diversity of produce generated by home gardens, the consumption of targeted foods, the income of program participants, and in some, but not all, cases, reduce levels of anemia among women and/or young children (2, 3). While recent efforts have begun applying program theory (Figure 1) to identify the pathways by which these programs are expected improve nutrition outcomes and to collect data along these pathways to inform adjustments to the design and maximize outcomes, a rigorous probability design has not previously been used to test the impact of the program on the anthropometry of women and children.

The operations research undertaken in the AAMA project was designed to address this knowledge gap, using a cluster-randomized, pre/post design in the Baitadi district of Nepal's Far Western Region. The evaluation included two cross-sectional surveys, one at baseline in year one and a post-intervention survey exactly three years later. In addition, process monitoring using lot quality assurance sampling (LQAS) was conducted every six months to assess the extent to which the project was delivering the program as intended by the program impact pathways model, and to better assess how the model did or did not achieve the intended outcomes. A randomized assignment of the intervention and control areas resulted in 21 intervention VDCs and 20 comparison VDCs out of a total of 61 of these units in the district.

The objective of the research was to test the impact of EHFP targeted to households with children 0-24 months of age on the prevalence of stunting, underweight, wasting and anemia. To best capture children's exposure to the program, the researchers chose to examine children 12-48 months of age, based on the assumption that children in this range at endline would have been exposed to the intervention for at least 12 months (estimated to be sufficient duration to benefit) between the ages of 0 and 24 months of age (the critical window). In addition, the impact of the intervention on maternal underweight and anemia were assessed. The study was designed as cross-sectional rather than longitudinal for practical reasons given the narrow age group to be studied. The research intended to test the following hypotheses:

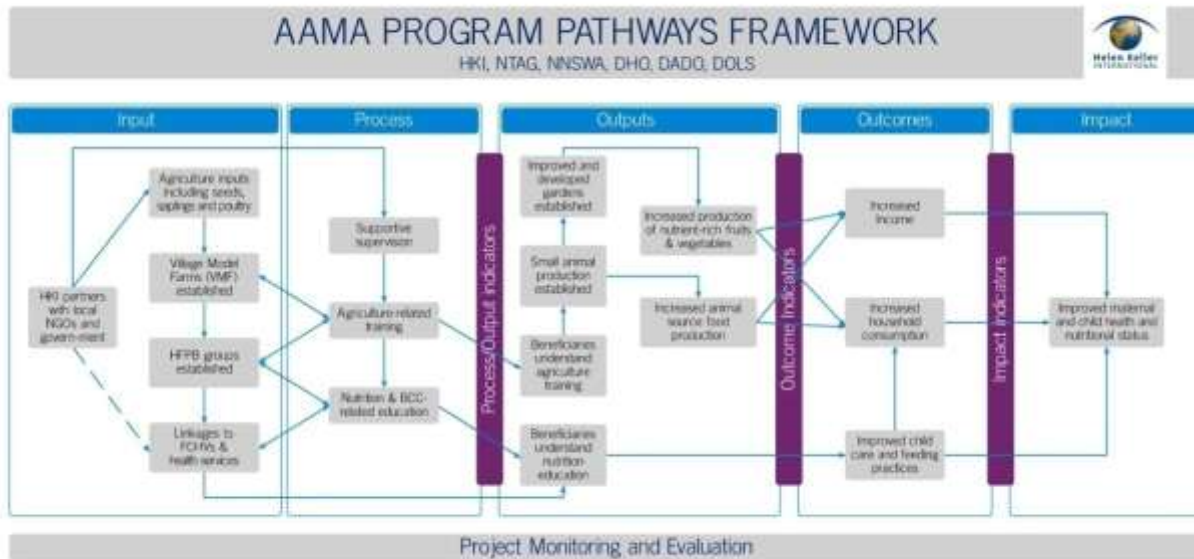
Exposure to the HFP+ENA intervention will reduce rates of **stunting** (length for age <-2SD WHO 2006 reference) by 10 percentage points, **underweight** (weight for age <-2 SD) by 10 percentage points, **wasting** (weight for length <-2SD) by 5 percentage points, and **anemia** (hemoglobin concentration < 110 g/L) by 15 percentage points in intervention compared to control children 12-48 months of age at endline compared to baseline.

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<sup>24</sup> HKI refers to the incorporation of ENA with HFP as Enhanced Homestead Food Production or EHFP.

Exposure to HFP + ENA intervention will reduce maternal **underweight** and **anemia**<sup>25</sup>, although we did not set specific targets to be achieved for these indicators.

**Figure 1: AAMA Program Pathways Framework**



Data were collected on a spectrum of other variables expected to influence or potentially confound the outcome, including socioeconomic status, household food security and agricultural production practices, access to and use of health services, and water and sanitation infrastructure, in order to control for any significant intervening variables in analysis. Data were also collected on variables along the impact pathways to evaluate the impact of the intervention on practices expected to contribute to the ultimate outcome and impact variables. Data analysis also included adjusting for clustering at the level of village development committees (VDCs) using random-effects regression models to assess the difference in change over time between the two groups and control for potentially confounding variables.

Because iron requirements are so difficult to meet in children with little or no access to fortified foods or supplements, HKI applied for and was awarded a grant from the Alive & Thrive project to include a **small nested sub-study** to test whether providing a micronutrient powder (Sprinkles) along with the HFP+ENA intervention had a greater impact on reducing anemia in young children than the HFP+ENA intervention alone. The details of methods and findings of this nested study have been reported elsewhere (4).

<sup>25</sup> Targets were not established for these outcomes but the survey instrument was designed to assess them.



## 2. Detailed description of innovation tested

**Intervention model:** For the food security element, village model farms (VMF) were established at the homestead of one leader mother in each of the six wards per VDC directly supported by the AAMA project). These mothers had to meet certain selection criteria (access to land and water adequate to sustain demonstration activities; proximate location to other participating households; at least one literate household member). These village model farmers were then trained by the project in both food production and ENA to, in turn, train and support members of two women's groups each comprised of 17-20 women who were pregnant or had a child < 2 years at recruitment (called Homestead Food Production Beneficiaries-HFPBs). Female Community Health Volunteers (FCHVs)<sup>26</sup> who were interested were given priority to become VMF managers; 28% of the VMFs in Baitadi were managed by FCHVs. In addition to technical training, VMFs and HFPBs were provided with seeds, chickens and on-going technical support for their HFP activities.

Following the training in HFP, a nutrition and behavior change communications training was provided to all VMFs as well as to all FCHVs in the intervention zones. Using the Essential Nutrition Actions (ENA) framework, it was intended to emphasize the importance of nutrition for pregnant and lactating women, exclusive breastfeeding for six months, enriching of complementary foods for children 6-24 months using nutrient rich plants and eggs from home production, and continued breastfeeding for at least two years. This training was then given by VMFs with the support of project staff to all HFPBs. The HFPB mothers then established their own homestead gardens with support from the model farms, met together monthly at the VMF to discuss techniques to improve garden production and ENA topics, act as a support group for each other, and were encouraged to share their expertise in both HFP and ENA with other mothers in their communities. FCHVs facilitated the nutrition discussions at these monthly meetings. Formative research conducted by HKI prior to the start of the intervention was used to tailor the nutrition BCC strategy to target local barriers to and enablers of uptake of new practices. Adult learning principles<sup>27</sup> were applied to make these discussion sessions interactive, stimulating and enjoyable.

**Study area:** Baitadi district is a hilly district located in the far western region of Nepal. With a total population of 257,659, the district is divided into 12 sub-districts called "Ilakas". Each "Ilaka" is further divided into an average of 5 village development councils (VDC), and each VDC consists of nine wards. The communities in this district engage mainly in subsistence farming and the majority of households have a kitchen garden. There are relatively few activities by non-governmental organizations in this district.

**Randomization:** A complete list of Ilakas and VDCs was obtained from the department of health in Baitadi district. Eight Ilakas were selected for the study based on their comparability on factors such as food availability, life expectancy, educational attainment, health service access, and poverty index, total number of VDCs, villages and number and size of households within these Ilakas. Of these, four Ilakas were then randomly assigned to the treatment arm (HFP+ENA) and four to the control arm (no intervention). The intervention was designed to create one VMF in six out of nine wards in each of the selected VDCs, not only to reach the 40 HFPBs and their households in each ward, but to achieve the maximum spillover through demonstration and advocacy by beneficiary women and enable dissemination of nutrition messages and improved gardening practices throughout as much of the entire treatment VDCs' population as possible.

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<sup>26</sup> Nepal's national Female Community Health Volunteer (FCHV) program was established in 1988 by the Ministry of Health to enhance the reach of the primary health care network through local volunteers. Across Nepal's 75 districts, there are now almost 50,000 FCHVs supporting primary health care activities and acting as a bridge between government health services and the community.

<sup>27</sup> The widely acknowledged theory that adults learn best by practice and reflection on their experiences.

**Survey sampling procedures:** For the baseline and endline surveys, a total of 14 VDCs were chosen within each study arm using the probability proportional to size technique; a total of 28 VDCs (14 treatment and 14 control) were included in the evaluation. The research design was cross-sectional, and thus separate samples were drawn for the two surveys. All nine wards and households within the selected VDCs were considered to be part of the study population.

A stratified, three stage, probability proportional to size (PPS) survey methodology was used, with the population defined by children 12-48 months and the VDC as the primary sampling unit. The framework for first stage sampling was based on the number of Illakas and their respective VDCs as enumerated by the most recent census (2001)<sup>28</sup>. A total of 28 VDCs were selected by the PPS method from the selected Illakas; 14 for each study arm. In the second stage, six wards were randomly selected for inclusion from each VDC.

The third stage was the random selection of households with a child in the 12-48 month age range. Guided by local residents, the interview team went to the center of a ward and used the spin of a pen to select the starting direction. The team then determined the number of houses located along a line extending in that direction from the centre of the ward to the outer boundary. A random number was selected as the count to the first eligible household. If a child in the stipulated age group was living in that particular household and the mother provided informed consent, the mother/caretaker of that child was interviewed. If the same household had another mother with a child of the 12-48 month age range, that child was also included for a full interview. The research team estimated that there would be one child aged 12-48 months eligible to participate in the study per every 3 households.

### 3. Internal Review Board (IRB) compliance

The study protocol was submitted to the Nepal Health Research Council (NHRC), Nepal's ethics review board, in February 2009 and was approved in June 2009.

The objectives of the study were also explained and consent was obtained from government officials and local community leaders in the study areas, as well as from all heads of households and parents or legal guardians of study children prior to data collection and implementation of the intervention. Children who were found to be severely anemic (Hemoglobin < 70.0 g/L), underweight (WAZ < -3), stunted (HAZ < -3) or wasted (WHZ < -3) were referred to the nearest community health facility for treatment but were not excluded from the analysis.

### 4. Study methodology

#### **Impact evaluation: baseline and endline data collection**

The study evaluated the impact of the intervention on the prevalence of stunting, underweight, wasting and anemia (assessed by Hemoglobin concentration) among children **12-48 months of age**. The program theory also hypothesized that increased production of nutrient-rich foods and improvements in the quality of women's dietary intake, breastfeeding practices and the quality of complementary foods and feeding practices would contribute to these outcomes, so these aspects were assessed as well. Additional information on socioeconomic variables that might also have an

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<sup>28</sup> Data from the 2011 census were not published until November 2012, after endline data collection.

influence on uptake of practices or ability to benefit from the intervention was also collected. As noted, the hypothesis was that this age group would have the greatest likelihood of being exposed to the intervention for at least 12 months between 0 and 24 months of age (the critical age window for nutrition interventions) and that this exposure period would be sufficient to positively influence growth.

**Sample size estimation:** The key outcome indicators of interest in the study were underweight, stunting, wasting and hemoglobin concentration among children 12-48 months. The sample size was calculated using a statistical significance of 0.05, a power (beta) of 0.80 and a 10 percentage point difference in differences in the rates of both underweight and stunting among children in the intervention compared to the control communities after the project. This sample size would also allow the detection of a 5 percentage point difference in the prevalence of wasting. Sample size was adjusted for the cluster-randomized design, using an assumed design effect of 2. Our calculations indicated a total of 1970 children would be required to test the main hypotheses of the study but to allow for some attrition the sample size was increased to n=2,106 children (n=1,055 from treatment communities; n=1,051 from control communities). In addition, researchers included n=203 children <6 months in the selected households in order to assess exclusive breastfeeding practices using the 24-hour recall question of WHO. The sample for the end line survey was n=2,614 (n= 1,307 treatment; n=1,307 control) plus n=230 children < 6 months. The baseline survey was implemented by HKI's Nepali partners, Nepali Technical Assistance Group (NTAG) and Snehi Mahila Jagaran Kendra (SMJK), with close supervision by HKI. To preserve independence, the endline survey was conducted by a Nepali research firm, PHIDRec.

**Data collection** for both baseline and endline entailed an interview with primary caretakers of study children using a household questionnaire and measurement of anthropometrics and Hemoglobin (Hb) concentrations of children and their mothers in intervention and control communities.

**Enumerator training:** At baseline, a total of 6 teams, each consisting of one interviewer and one anthro/lab assistant, together with one survey supervisor and one quality controller conducted the fieldwork. An 8-day basic training was given in January 2009 to the survey team in Kathmandu before data collection in Kailali district (February 2009) where the project was also to be implemented, and a two-day refresher training was given in Baitadi in July, 2009, just before that baseline survey was conducted (July-August, 2009). The training was divided into three parts. The first part included an introduction to the program, objectives and methodologies of the baseline survey, general interviewing techniques and a detailed review of each question of the questionnaires. The second part included training on anthropometry measurements (weight and length), hemoglobin measurements and use of a Global Positioning System (GPS) machine to collect spatial data (X,Y and Z coordinates). For the standardization of the survey team in anthropometric measurements, training manuals developed by the FANTA Project (5), translated into Nepali, were used. The third part of the training consisted of a three-day field practice in the Kathmandu Valley and a one-day field practice in Dasarathchand Municipality, Baitadi. During data collection, quality was assured by daily debriefings between surveyors and supervisors, reviewing of completed questionnaires, and spot checks of 10% of all surveys and measurements against households.

The training for the PHIDReC end line survey team took place over four days, including a one-day field practice. There were nine data collection teams, each comprised of one supervisor and two interviewers, and each team covered approximately three VDCs.

- (a) Quantitative household surveys:** The questionnaire included 350 items covering household demographic and socio-economic characteristics, homestead food production, purchasing and consumption practices, food security, water and sanitation facilities and hygiene practices, antenatal and postnatal care, infant and young child feeding practices, child immunization status, morbidity and management of childhood diseases, household participation in community groups, exposure to project agricultural activities and resources, exposure to FCHVs and nutrition messages, and knowledge of ENA messages. Breastfeeding and complementary feeding practices used with study children were assessed using the WHO indicators for assessing infant and young child feeding practices (2010).
- (b) Anthropometric assessments:** Weight, recumbent length of children aged <2 years and height of children > 2 years, and height of mothers were measured according to internationally recommended procedures (5). Weight was measured using a portable electronic weighing scale, which was calibrated daily. Recumbent length or standing height were measured using a ShorrBoard®.
- (c) Biomarker assessments:** Finger prick of blood was taken from children and their mothers and hemoglobin concentration was measured in the field using HemoCue ® analyzer.
- (d) Qualitative and operations research:** At baseline, qualitative data collection was conducted concurrently with the quantitative baseline survey using focus group discussions and in-depth interviews in order to inform the design of the behavior change communications strategy (6). At the mid-term and final evaluation additional qualitative research was conducted led by an external consultant, to explore take-up of production and nutrition practices and the most salient barriers and facilitators, in order to provide further insights into the quality of program delivery and address areas of weakness.

During the course of program implementation, four rounds of surveys using lot quality assurance sampling (LQAS) were conducted to assess whether project activities were proceeding as planned and, as necessary, inform course corrections. These data were also used to evaluate progress along the hypothesized impact pathways, and to provide additional evidence for the impact evaluation that outcomes among beneficiary populations were likely due to the program activities and not due to bias, confounding or chance (7). The surveys were based on the project schema of hypothesized pathways of program impact (Figure 1) and included observations and questions excerpted from the baseline survey and were intended to assess beneficiary comprehension and application of the contents of HFP and ENA training. The nutrition knowledge and practices section of the LQAS rounds focused on mothers with children <24 months of age to assess whether complementary feeding practices were improving and incorporating products from HFP.

## 5. Timeline for study

The impact evaluation was executed over three years of project implementation and was estimated to capture two years of the complete integrated intervention.

**Table 1: Project timeline**

Stage	Start date	End date
Preparation, development of program theory, program design and implementation strategy for Baitadi	3/1/09	5/31/09
Design of baseline/end line questionnaire and preparation for execution	6/1/09	7/15/09
Baseline survey field work and data entry (including qualitative research)	7/15/09	8/31/09
Analysis of baseline data, dissemination workshop in Nepal	9/1/09	11/15/09
Implementation of main intervention (HFPP-ENA vs. control)	9/1/09	9/1/12
Round 1 of process monitoring.	8/1/10	8/31/10
Analysis of process monitoring data, consultation on program adjustment/improvement	9/15/10	11/1/10
Round 2 of process monitoring, rapid feedback for implementation	2/1/11	3/1/11
Round 3 of process monitoring, rapid feedback for implementation	8/1/11	8/31/11
Round 4 of process monitoring	3/1/12	3/31/12
Final survey field work and data entry	7/15/12	8/31/12
Final qualitative evaluation	9/13/12	9/30/12
Analysis of final evaluation and survey data, dissemination workshop in Nepal	9/30/12	11/30/12
Preparation of journal manuscripts, conference presentations, etc.	12/1/12	6/1/13

## 6. Data analysis

Data were analyzed using SPSS version 20 and Stata version 11. Initial descriptive statistics were examined comparing control and treatment groups at baseline ( $T_0$ ) and endline ( $T_1$ ), followed by within group comparisons between baseline and endline; proportions and means/medians were used for this phase of analysis. Differences found in bivariate analyses were tested for significance using 2-sided Fisher's exact chi-square tests with proportions, independent sample t-tests for means, and Mann-Whitney U-tests for medians. Variables in these bivariate comparison included HFP income and production; IYCF knowledge and practices; preventive healthcare utilization; child morbidity; food security; and maternal and child nutritional status (anthropometrics, hemoglobin and maternal night blindness). Logistic regression with interaction between treatment and time was used to compare the difference in changes in proportion between the treatment and control groups, from baseline to endline, for the outcome and impact variables of interest. First, crude logistic regression models were run; this was followed by an adjusted regression model, controlling for variables that were found to be significantly different ( $<0.05$ ) in the bivariate analysis. Covariates in the regression models were demographic and socioeconomic variables that differed significantly between groups at baseline, and were independent of the pathway to impact. This

included: number of children in household; sex of household head; caste (lower or upper<sup>29</sup>); respondent working outside the home (yes/no); respondent pregnant; mother's education (none vs. any formal); and mother primary caretaker (yes/no). Biological factors, including child's sex and age and mother's age, were also controlled for in analysis of respective nutritional outcomes as the literature shows these can confound outcomes. Linear regression was also used to compare the difference in changes in median of several continuous variables between the treatment and control groups, from baseline to endline. As these variables were not normally distributed, log transformation was used and, upon confirmation of normal distribution of the natural logs of each variable, linear regression was conducted. The coefficients from these regressions are presented, along with their 95% confidence intervals. Analysis was based on intent to treat and also adjusted for clustering of effects at the VDC level using a random-effects model.

## 7. Results

In this section we present first the double difference results of crude logistic and linear regressions for intermediate outcomes along the impact pathways. In other words, we present preliminary findings of some of the contributing factors for which changes were found to be statistically significant in treatment compared to control communities before full adjustment for potential confounders. For this report, only the ultimate outcomes of maternal and child nutritional status have been thoroughly analyzed and controlled for confounders and significant differences at baseline. Future reports will include more detailed analysis of the various program components that contribute to program impact.

In addition, we present some of the findings from the process monitoring (LQAS) where these add evidence of uptake of production and nutrition practices. These data are included in Appendix 1.

### Measures of Household Welfare

In initial analysis there are indications that although income differed significantly at baseline, monthly household income increased relatively more among households (HH) in treatment zones compared to control HH. The crude regression showed that, at endline, households in the EHFP intervention were 42% less likely to have no monthly income [OR 0.58 (0.45 – 0.73)] and 39% more likely to have income > 4000 Rs. [1.39 (1.07 – 1.82)] compared to those in control areas. In addition, the odds of owning poultry [OR 2.64 (1.93 – 3.62)], being engaged in HFP [OR 13.13 (8.64 – 19.9)] and owning fruit trees [OR 1.28 (0.79 – 2.08)] were significantly higher at post-intervention in treatment compared to control group. The relevant proportions are presented in Table 2 below.

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<sup>29</sup>Upper caste included: Brahmin, Chetri, Giri, or Thakuri; lower caste included: Dalit, disadvantaged Janajatis, relatively advantaged Janajatis, disadvantaged non-Dalit Terai caste, and religious minorities.



**Table 2. Changes in Assets**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
<i>n</i>	2106	1055	1051	2614	1307	1307
<i>Cash income in last month</i>						
No cash income	48.0	46.7	49.2	31.1#	24.3#	38.0*#
≥ Rs. 4,000	21.2	26.5	15.9*	41.3#	52.9#	29.7*#
<i>Production assets</i>						
Has poultry	13.3	11.9	14.7	23.1#	29.5#	16.7*
Has HFP	48.0	44.8	51.2*	88.9#	97.6#	80.2*#
Has fruit trees (% yes)	74.3	79.2	69.4*	81.6#	89.1#	74.1*#

\*Different from corresponding treatment group,  $P < 0.05$ ; #Different from baseline value,  $P < 0.05$ .

## Agricultural Production

The quality of gardens improved markedly in treatment areas; that is, proportions of households with improved gardens (more diversified production) or developed gardens (diversified with year round production) [OR 37.8 (8.38 – 170.2)]. Families in the treatment communities were growing a greater number (almost 60% more) of different types of vegetables [Coefficient (95% CI): 0.59 (0.52 – 0.65);  $p < 0.05$ ], produced a quantity of vegetables (kg) that was 81% greater [0.81 (0.68 – 0.93);  $p < 0.05$ ] and more eggs by almost 40% [0.39 (0.10 – 0.68);  $p < 0.05$ ] than those in control communities. The relevant proportions are presented below. While the changes in poultry production were statistically significant, the increases in production did not meet expectations, mainly due to inadequate use of chicken coops and logistical challenges to delivering reliable vaccines on an on-going basis. These weaknesses are being addressed, but solutions were not scaled up within the research period.

**Table 3: Homestead food production by households**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
<i>n (with home garden)</i>	839	398	441	2266	1262	1004
Type of home garden						
Traditional	99.0	98.7	99.3	65.7#	40.0#	97.9*
Improved	0.8	1.0	0.7	18.7#	31.9#	2.0*
Developed	0.1	0.3	0.0	15.7#	28.1#	0.1*
Crops grown in home garden						
Number of types of vegetable	4.0 (2.0)	4.0 (2.0)	4.0 (2.0)	6.0 (4.0) #	8.0 (4.0) #	4.0 (2.0) *#
Food produced from HFP (last 2 months)						
Vegetables (kg)	10.0 (15.3)	10.0 (15.5)	10.0 (15.5)	20.0 (30.0) #	30.0 (30.0) #	13.0 (12.0) *#
Eggs (count) <sup>1</sup>	10.0 (23.0)	8.0 (25.0)	10.0 (20.0)	25.0 (45.0) #	30.0 (45.0) #	20.0 (30.0) *#

<sup>1</sup> $n=279$  at baseline,  $n=587$  at endline; \*Different from corresponding treatment group,  $P < 0.05$ ; #Different from baseline value,  $P < 0.05$ .

The findings of the four rounds of LQAS also consistently showed HH in intervention zones with a greater variety of vegetables under production and a greater proportion with poultry (Appendix 1).

## Household Food Security

Crude analysis of perceptions of HH food security as measured by the FANTA HFIAS index suggest improvements in both zones, but a relatively greater improvement in treatment compared to control communities. The odds of perceiving their HH to be food secure was higher [OR 1.77 (1.31 – 2.37);  $p < 0.05$ ] while odds of perceiving severe food insecurity was lower [OR 0.43 (0.33 – 0.56);  $p < 0.05$ ] in treatment compared to controls, and the mild and moderate categories moved in similar directions. However, it is important to note that different recall periods were used at baseline (the past 12 months) and endline (the past month), which may have influenced the responses. Nevertheless, since households were randomized to treatment in this study, we believe such differences in recall will be similar in the treatment and control areas and therefore will not significantly influence these findings. We also believe that responses to these questions at baseline likely reflected more recent experiences, but it is not possible to verify this. Table 4 below presents the relevant proportions.

**Table 4: Household food insecurity**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
<i>n</i>	2025	1055	970	2614	1307	1307
Food insecurity level, %						
Food secure	16.6	20.3	12.6*	34.1#	46.4#	21.7*#
Mildly food insecure	20.8	21.7	19.9	16.0#	17.4#	14.5*#
Moderately food insecure	12.0	8.8	15.4*	29.6#	23.3#	35.8*#
Severely food insecure	50.6	49.2	52.2	20.4#	12.9#	27.9*#

\*Different from corresponding treatment group,  $P < 0.05$ ; #Different from baseline value,  $P < 0.05$ .

## Primary Caregiver Feeding, Care, and Health Knowledge

A range of significant improvements in caregiver knowledge were recorded, regarding both women's and children's health. Appreciation of the importance of exclusive breastfeeding for six months increased considerably in both treatment and control communities, but still significantly more in the treatment zone [OR 7.45 (5.18 – 19.73);  $p < 0.05$ ] than control. Particularly striking is the proportion of mothers who understand the importance of feeding eggs to children from six months, a major message of the program: an increase of 51.5 percentage points between baseline and endline compared to no change in controls [OR 9.48 (7.32 – 12.27);  $p < 0.05$ ]. This achievement is especially important given that poultry raising and consumption was a taboo among much of the population before AAMA. Qualitative research conducted by project staff indicates that while older people still refuse to consume any chicken products, they support feeding these too young children as a way to meet their high nutrient needs.

Women's knowledge of their own nutritional needs also increased in treatment relative to control communities on a number of indicators. Women were more likely to cite the importance of eating eggs [OR 13.22 (10.18 – 17.15);  $p < 0.05$ ] and of being able to cite all three rich sources of nutrients (micronutrient-rich plants, eggs and milk products) [OR 13.50 (10.40 – 17.52);  $p < 0.05$ ]. Women in intervention zones were also significantly more likely to know that a woman should eat more during pregnancy to nourish the fetus [OR 6.30 (4.67 – 8.49);  $p < 0.05$ ].



**Table 4: Nutrition and Health Knowledge <sup>1</sup>**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
<i>n</i>	2106	1055	1051	2614	1307	1307
Importance of exclusive breastfeeding for 6 months	67.8	63.8	71.8*	89.4#	96.1#	82.7*#
<i>Complementary Feeding</i>						
Animal source foods good from 6 months						
Eggs	29.7	28.7	30.7	56.1#	80.2#	32.0*
Milk or yoghurt	84.2	82.7	85.8*	90.6#	92.0#	89.1*#
Meat/organ meat	42.8	41.5	44.1	68.8#	80.0#	57.7*#
# of animal source foods mentioned as 'best' for young children <sup>2</sup>						
None mentioned	10.4	10.5	10.2	2.7#	1.0#	4.4*#
1	44.7	46.1	43.3	23.2#	10.8#	35.6*#
2	22.8	23.4	22.3	30.1#	23.3	37.0*#
All 3	22.1	20.0	24.3*	44.0#	64.9#	23.1*
<i>Foods Recommended for Pregnancy</i>						
Micronutrient-rich fruits/vegetables	71.6	67.2	75.9*	97.2#	99.3#	95.1*#
Eggs	35.4	31.8	39.0*	61.3#	85.2#	37.4*
Milk or yoghurt	63.5	60.7	66.3*	87.0#	90.1#	83.8*#
Women should eat more during pregnancy	58.0	61.9	54.1*	77.4#	93.3#	61.5*#
# of nutritious foods mentioned as 'best' for pregnant women <sup>2</sup>						
None mentioned	16.1	16.9	15.4	0.5#	0.0#	1.0*#
1	25.3	29.3	21.2*	7.5#	2.9#	12.0*#
2	30.6	31.1	30.1	38.1#	19.5#	56.7*#
All 3	28.0	22.7	33.3*	53.9#	77.6#	30.3*

<sup>1</sup>Values are percent. <sup>2</sup>Total number of possible response categories limited to 3 (eggs, milk/yoghurt, and meat/organ meat).

\* Different from corresponding treatment group,  $P < 0.05$ ; #Different from baseline value  $P < 0.05$ .

## Maternal Nutrition and Infant and Young Child Feeding Practices

The practices related to breastfeeding practices, including immediate initiation, the feeding of colostrum and avoidance of prelacteals, did not differ across the two zones. Reports of exclusive breastfeeding by mothers of infants <6 months increased from 62.5 to 76.7% among HH in the treatment zone compared to a stagnant 61.6 and 63% in control communities [OR 1.86 (0.83 – 4.20)], but this difference was not significant. Because the study was not powered to test exclusive breastfeeding, the subsample for this variable may have been too small.

By contrast, numerous measures of dietary quality did improve significantly in treatment compared to control communities in crude analysis: at post intervention the odds of receiving a minimum dietary diversity [OR 5.33 (3.50 – 8.11);  $p < 0.05$ ] as well as the odds of receiving a minimum

acceptable diet [OR 5.36 (3.53 – 8.14)], both as defined by the World Health Organization (8), was five-fold higher in the treatment than the control groups. In addition, there were significant increases in the odds of being fed vitamin A-rich fruits and vegetables [OR 6.94 (4.14 – 11.61);  $p < 0.05$ ], legumes [OR 5.22 (3.26 – 8.34);  $p < 0.05$ ] and eggs [OR 3.94 (1.20 – 13.0);  $p < 0.05$ ]. As can be seen in Table 6 below, the degree of egg consumption increased far more modestly than expected. (The challenges to scaling up poultry production are discussed in detail in the final evaluation report.) Consumption of animal-source flesh foods did not change in either zone and remained  $< 10\%$  in each. Changes in dairy consumption were also modest [OR 1.80 (1.07 – 3.02);  $p < 0.05$ ], although levels were comparatively high at  $> 75\%$  in both zones.

We did not collect dietary recall data from women, but our subsample of pregnant women ( $n = 482$ ) were asked if they ate less, the same quantity or more food during their pregnancy compared to before the pregnancy. Women in the intervention zone were significantly more likely to report eating more [OR 4.45 (1.56 – 12.63);  $p < 0.05$ ].

The findings of the LQAS rounds also consistently showed relatively higher proportions of children 6-23 months fed minimum acceptable diets and plant foods rich in vitamin A and iron in treatment compared to control zones. They also appeared to indicate appreciably higher proportions of children in treatment zones fed iron-rich animal source foods and eggs compared to control zones (Appendix 1).

The feeding practices of mothers of children 12-23 months of age who suffered illness in the two weeks prior to the survey improved with regard to breastfeeding during illness among treatment compared to control communities [OR 4.46 (0.97 – 20.57)], although the change was borderline significant ( $P = 0.055$ ), possibly due to the small sample size. Feeding more foods during illness did not change significantly. It is frequently easier for mothers to coax children to eat more after illness; unfortunately, we did not measure this practice. The proportions are presented in Table 7 below.

**Table 6: Infant and young child feeding practices of mothers<sup>1</sup>**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
<i>n</i>	750	371	379	943	412	531
Breastfeeding, %						
Ever breastfed	100.0	100.0	100.0	100.0	100.0	100.0
Currently breastfeeding	95.5	96.5	94.5	92.0 <sup>#</sup>	93.2 <sup>#</sup>	91.1
Breastfed within 1 hour of birth <sup>2</sup>	54.7	59.2	50.4 <sup>*</sup>	43.9 <sup>#</sup>	52.2 <sup>#</sup>	37.5 <sup>*#</sup>
Fed colostrum	93.3	93.0	93.7	93.7	96.4 <sup>#</sup>	91.7 <sup>*</sup>
Fed pre-lacteals <sup>3</sup>	4.0	4.6	3.4	2.7	1.7 <sup>#</sup>	3.4
Exclusive breastfeeding <sup>4</sup> , %	62.1	62.5	61.6	69.1	76.7 <sup>#</sup>	63.0 <sup>*</sup>
Complementary feeding, %						
Grains, roots and tubers	98.4	98.1	98.7	99.6 <sup>#</sup>	99.5	99.6
Legumes	54.8	55.5	54.1	74.8 <sup>#</sup>	90.3 <sup>#</sup>	62.7 <sup>*#</sup>
Dairy	81.2	78.4	83.9 <sup>*</sup>	85.0 <sup>#</sup>	86.7 <sup>#</sup>	83.8 <sup>*</sup>
Meat/organ/poultry/fish/snails	4.4	4.6	4.2	4.9	5.6	4.3
Eggs	2.1	2.7	1.6	7.7 <sup>#</sup>	14.6 <sup>#</sup>	2.4 <sup>*</sup>
Vitamin A rich fruits and vegetables	65.4	63.1	66.0	79.1 <sup>#</sup>	93.0 <sup>#</sup>	68.4 <sup>*</sup>
Other fruits and vegetables	24.1	27.2	21.1 <sup>*</sup>	27.9	38.1 <sup>#</sup>	20.0 <sup>*</sup>
Fed minimum dietary diversity	41.9	41.5	42.2	62.2 <sup>#</sup>	82.0 <sup>#</sup>	46.9 <sup>*</sup>
Fed minimum meal frequency	85.6	83.8	87.3	93.6 <sup>#</sup>	96.4 <sup>#</sup>	91.5 <sup>*#</sup>
Fed minimum acceptable diet	36.7	35.6	37.7	59.5 <sup>#</sup>	79.4 <sup>#</sup>	44.1 <sup>*</sup>

<sup>1</sup>Values are percent. <sup>2</sup>n=749 at baseline <sup>3</sup>n=942 at endline <sup>4</sup>Study child sibling below 6 months of age, n=203 at baseline and 230 at endline. \*Different from corresponding treatment group,  $P < 0.05$ ; #Different from baseline value  $P < 0.05$ .

**Table 7: Breastfeeding and complementary feeding during recent illness of study child 12-23 months of age**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
<i>n</i>	70	24	46	117	47	70
Breastfeeding, %						
Breastfed less than usual	44.1	33.3	50.0	20.5 <sup>#</sup>	12.8	25.7 <sup>#</sup>
Breastfed same as usual	37.1	50.0	30.4	23.1 <sup>#</sup>	12.8 <sup>#</sup>	30.0 <sup>*</sup>
Breastfed more than usual	18.3	16.7	19.6	56.4 <sup>#</sup>	74.5 <sup>#</sup>	44.3 <sup>*#</sup>
<i>n</i>	65	22	43	121	47	74
Complementary feeding, %						
Less than usual	63.1	68.2	60.5	57.0	53.2	59.5
Same amount	32.3	27.3	34.9	22.3	19.1	24.3
More than usual	4.6	4.5	4.7	20.7 <sup>#</sup>	27.7 <sup>#</sup>	16.2

Illness within two weeks prior to survey; complementary foods defined as solid, semi-solid and soft foods

\* Different from corresponding treatment group,  $P < 0.05$ ; # Different from baseline value  $P < 0.05$ .

## Maternal and Child Health Practices

The project also sought to increase appropriate health care seeking behaviors among exposed HH. Use of preventive services for children increased considerably yet by similar magnitude in both zones. Among women, however, numerous improvements appeared to be significantly greater in treatment compared to control zones. The odds were significantly higher of making  $\geq 4$  antenatal visits during their most recent pregnancy [OR 1.50 (1.14 – 1.98);  $p < 0.05$ ], receiving skilled assistance during last delivery [OR 3.72 (2.69 – 5.15);  $p < 0.05$ ], having taken any iron-folic acid tablets [OR 2.70 (1.95 – 3.73);  $p < 0.05$ ], receiving deworming treatment [OR 4.20 (3.20 – 5.52);  $p < 0.05$ ] during and vitamin A supplementation after [OR 3.06 (2.38 – 3.92);  $p < 0.05$ ] the most recent pregnancy, and reports by currently pregnant women of eating more [OR 4.45 (1.56 – 12.63);  $p < 0.05$ ]. Table 8 presents these proportions.

**Table 8: Use of Preventive health services**

	Baseline			Endline		
	Total	Treatment	Control	Total	Treatment	Control
<i>n</i>	2106	1055	1051	2614	1307	1307
For children						
Participation in growth monitoring	42.0	50.6	33.3*	63.4#	75.4#	51.4*#
DPT vaccination (3 doses) <sup>a</sup>	76.3	79.7	73.0*	97.4#	98.6#	96.2*#
Deworming (last 6 months) <sup>b</sup>	88.0	85.5	90.6*	93.8#	94.8#	92.8*
Measles vaccination <sup>c</sup>	90.3	90.0	90.5	97.2#	98.3#	96.2*#
Vitamin A supplementation (last 6 months)	94.5	93.6	95.3	96.8#	98.0#	95.6*
For mothers (last completed pregnancy)						
Received antenatal care	70.1	70.0	70.2	89.1#	93.0#	85.2*#
Antenatal visits <sup>d</sup>						
$\geq 4$ visits	24.8	29.3	20.2*	51.5#	64.2#	38.8*#
Source of antenatal care <sup>d</sup>						
HA/AHW	19.9	10.4	29.3*	34.2#	29.4#	39.4*#
MCHW	40.8	54.8	26.7*	42.2	48.3#	35.5*#
Doctor/staff nurse/ANM	39.2	34.6	43.8*	23.4#	22.1#	24.9#
Other	0.2	0.1	0.1	0.2	0.2	0.3
Took iron-folate tablets	74.7	72.2	77.3*	88.9#	92.3#	85.4*#
Took deworming tablet (s)	50.3	44.6	56.0*	81.4#	88.5#	74.4*#
Received assistance during delivery	76.4	71.8	81.0*	88.3#	92.3#	84.2*#
Received post-partum vitamin A supplement	38.5	35.5	41.4*	71.7#	80.3#	63.1*#

<sup>a</sup> n= 2,044 at baseline <sup>b</sup> n= 2,105 at baseline <sup>c</sup> n= 2,090 at baseline <sup>d</sup> n=1,474 at baseline and 2,329 at endline. HA/AHW = health assistant/auxiliary health worker. \* Different from corresponding treatment group,  $P < 0.05$ ; # Different from baseline value,  $P < 0.05$ .

## Child Nutritional Status

Despite these many potentially important improvements in both production and nutrition practices in treatment vs. control zones, the adjusted logistical regression model for child anthropometry controlling for significant differences in potentially confounding factors (number of children in household; sex of household head; caste; respondent working outside the home; respondent pregnant; mother's education; mother primary caretaker; child's sex and age; and mother's age) indicates no statistically significant difference in differences in the rates of stunting, underweight or wasting between the two zones (treatment x time variable). There was, however, a borderline significant 23% lower odds of low hemoglobin in the treatment compared to control communities [OR 0.77 (0.60 – 1.00); p=0.051]. Table 9 presents the DID outcomes as well as the other variables included in the adjusted model.

## Maternal Nutritional Status

The results for maternal nutritional status were more encouraging. The adjusted model (controlling for number of children in the HH; sex of HH head; caste; respondent working outside the home; woman's education and mothers age) indicates that women in treatment communities had a 37% significantly reduced odds of underweight [OR 0.63 (0.47 – 0.84; p<0.05) as well as a 41% reduced odds of low hemoglobin (this model also controlled for pregnancy status) [OR 0.59 (0.45 – 0.76); p<0.05]. Table 10 presents the DID outcomes and the variables included in the adjusted model.

**Table 9: Adjusted logistic regressions for assessing the effect of EHFP on changes in prevalence of stunting, wasting, underweight and anemia among children<sup>1</sup>**

Binary outcome variable <sup>2</sup>	Stunting <sup>3</sup>	Wasting <sup>4</sup>	Underweight <sup>5</sup>	Child anemia <sup>6</sup>
Treatment	0.73 (0.61 – 0.88)*	1.13 (0.84 – 1.50)	0.83 (0.70 – 0.99)*	0.84 (0.69 – 1.02)
Time	0.91 (0.77 – 1.09)	0.93 (0.71 – 1.23)	0.74 (0.62 – 0.87)*	1.55 (1.30 – 1.85)*
<b>Treatment X time</b>	<b>0.93 (0.73 – 1.18)</b>	<b>0.99 (0.68 – 1.45)</b>	<b>1.13 (0.89 – 1.43)</b>	<b>0.77 (0.60 – 1.00)#</b>
Number of children in HH	1.08 (1.03 – 1.14)*	1.03 (0.96 – 1.11)	1.09 (1.04 – 1.14)*	0.98 (0.93 – 1.03)
Male headed HH	1.10 (0.93 – 1.30)	1.19 (0.89 – 1.59)	1.06 (0.90 – 1.26)	0.90 (0.76 – 1.08)
Upper caste	0.66 (0.57 – 0.77)*	0.67 (0.54 – 0.83)*	0.55 (0.48 – 0.64)*	0.69 (0.59 – 0.80)*
Respondent works outside home	0.88 (0.74 – 1.05)	0.89 (0.69 – 1.16)	0.94 (0.79 – 1.11)	0.95 (0.80 – 1.14)
Respondent pregnant	1.09 (0.89 – 1.34)	0.87 (0.61 – 1.22)	1.09 (0.90 – 1.33)	0.84 (0.68 – 1.04)
Mother has no formal edu.	1.10 (0.96 – 1.26)	1.14 (0.91 – 1.43)	0.99 (0.86 – 1.14)	1.05 (0.90 – 1.21)
Child age (m)	1.01 (1.00 – 1.01)*	0.98 (0.97 – 0.99)*	1.01 (1.00 – 1.02)*	0.94 (0.93 – 0.95)*
Child sex (male)	1.02 (0.90 – 1.15)	1.37 (1.13 – 1.66)*	0.95 (0.84 – 1.06)	1.11 (0.98 – 1.26)
Mother primary care-giver	1.07 (0.94 – 1.22)	1.13 (0.91 – 1.40)	1.10 (0.97 – 1.26)	0.95 (0.83 – 1.09)
Constant	1.58*	0.15*	0.86	3.78*

<sup>1</sup> Values are regression coefficients (95% CI) <sup>2</sup> Defined in the Analysis section <sup>3</sup> n = 4,692 <sup>4</sup> n = 4,703 <sup>5</sup> n = 4,717 <sup>6</sup> n = 4,717  
\* P < 0.05 # Borderline significant, P = 0.051

**Table 10. Adjusted logistic regressions for assessing the effect of EHFP on changes in underweight and anemia among mothers<sup>1</sup>**

Binary outcome variable <sup>2</sup>	Maternal underweight <sup>3</sup>	Maternal anemia <sup>4</sup>
Treatment	1.84 (1.47 – 2.31)*	0.97 (0.79 – 1.19)
Time	1.40 (1.12 – 1.74)*	1.82 (1.52 – 2.17)*
<b>Treatment X time</b>	<b>0.63 (0.47 – 0.84)*</b>	<b>0.59 (0.45 – 0.76)*</b>
Number of children in HH	1.04 (0.97 – 1.11)	1.02 (0.95 – 1.09)
Male headed HH	1.01 (0.82 – 1.24)	0.97 (0.81 – 1.16)
Upper caste	0.56 (0.47 – 0.66)*	0.73 (0.62 – 0.85)*
Respondent pregnant	-	1.00 (0.80 – 1.24)
Respondent works outside home	1.02 (0.83 – 1.24)	0.98 (0.82 – 1.17)
Mother has no formal educ.	1.03 (0.87 – 1.23)	0.99 (0.85 – 1.16)
Mother age (y)	1.01 (0.99 – 1.03)	0.99 (0.97 – 1.00)
Constant	0.21*	0.56*

<sup>1</sup> Values are regression coefficients (95% CI) <sup>2</sup> All cut-offs for each dependent variable are defined in the Methods section

<sup>3</sup> n = 4,236 <sup>4</sup> n = 4,716 \*P < 0.05

## 8. Discussion

The AAMA project was expected to improve nutritional status of young children and women of reproductive age through two primary impact pathways: increasing the availability of high quality, micronutrient-rich foods through increased household production of these foods (and potentially by increasing income through the sale of surplus production); and increasing knowledge and adoption of optimal health and nutrition-related practices through the health and nutrition behavior change communications strategy. To evaluate the effectiveness of this program we examined the impact of the program on the primary outcome of nutritional status and along a number of intermediate outcomes along the hypothesized program impact pathways: increased ownership of assets, perceptions of food security, more diversified homestead food production, and nutrition knowledge and practices.

The intermediate outcomes indicate that the AAMA program was successful in increasing women’s agricultural production in treatment compared to control communities, including increasing the diversity and volume of vegetable production and a modest increase in poultry holdings and production. It also appears to have contributed to increased cash income and improved perceptions of food security. These results are consistent with other studies that have shown an impact of small-scale agriculture interventions on household food production (9, 10).

Women’s poultry production, an important objective of the intervention, improved less than hoped. The introduction of improved local breeds required more improved husbandry practices than HFPBs provided and there were high losses due to predators, accidents and disease. Although the project provided fully vaccinated animals to beneficiaries, the logistics of ongoing vaccination services proved quite challenging in light of the limited resources of the government’s district livestock offices, supply chain limitations and the difficult terrain. After exploring numerous options, the government and project teams piloted a community-based vaccination approach that shows promise, but was not able to reach scale within the life of the project. Lessons learned that will improve husbandry practices are being taken forward by the government and the USAID-funded Suaahara project.

Although the interventions likely achieved moderate increases in food availability, they appeared to have been sufficient to change perceptions of food security. The challenges to food security in Baitadi are considerable, with most communities located a great distance from markets where they can both sell and buy necessities. Constraints to sustainable production, including water and irrigation resources, input supplies, and extension services remain important, and climate changes appear to be exacerbating these problems (11). Thus additional interventions are needed to address food security comprehensively.

The project also appears to have had a number of significant achievements along the health and nutrition pathway, including both knowledge and practices. Knowledge on a number of health and nutrition practices was significantly higher among women in the intervention villages as compared to the control villages. Most notably, perhaps, was the appreciation of the importance of eggs for meeting the nutritional needs of children starting at six months, overcoming long-standing perceptions of poultry as dirty and unfit for human consumption.

Somewhat surprisingly, the practice of initiation of breastfeeding within one hour of birth did not improve, and the use of prelacteal feeds was already quite low in both study arms and did not change. Increases in the rate of exclusive breastfeeding were not significant in treatment compared to control communities, possibly due to the small sample size. On the other hand, many of the young child feeding practices that should be influenced by garden production together with BCC did indeed show significant improvements: minimum dietary diversity, minimum acceptable diet, consumption of iron-rich legumes, vitamin-A rich plant foods, dairy and eggs. Egg consumption was below what we had hoped to achieve due to the obstacles to production noted above. No improvement was seen in feeding of nutrient-dense animal flesh foods, likely because supply is quite limited in these communities, a constraint found in numerous settings (12). Nevertheless, by endline the proportion of children 12-23 months fed a minimum acceptable diet in the treatment arm reached just shy of 80 percent from a baseline of 36 percent, a major accomplishment.

The impact of the program on children's hemoglobin concentrations was borderline significant: the difference in differences indicated the treatment group had a 23% reduced risk of low hemoglobin ( $p < 0.051$ ). It is plausible that the increased dietary diversity, which included legumes, vitamin C and vitamin A-rich plants, contributed to improved anemia status. Research in diverse settings has shown impact on anemia (3, 13). It is likely that other factors such as control of intestinal helminthes and other infections and increased access to iron-rich animal source foods need more attention to have a stronger impact on anemia in children.

We also did not detect any significant impacts of the E-HFP program on children's growth. In a comprehensive review of the impact of interventions conducted in developing countries to improve child growth through various means, including nutrition education with and without food-based strategies, the majority failed to demonstrate a significant impact on growth (14). It is possible that chronic infections that lead to environmental enteropathy reduce the impact of improved dietary intake as additional calories and nutrients are expended fighting infection or are not absorbed due to intestinal permeability (15, 16). It is further possible that our project's relatively modest impact on hygiene behaviors and the nutritional care of the sick and recovering child meant a reduced potential for impact on growth. It is conceivable that the full model of improved food production and nutrition practices did not reach sufficient strength within the period examined to achieve a significant impact on growth, or that the amount of additional food still did not meet energy or certain micronutrient requirements for robust growth. The project did not achieve the targeted increase in poultry production, and animal source foods provide essential nutrients to children in





the high growth 6-23 month period; the WHO recommends daily intake. Nevertheless, the prevalence and degree of stunting in this setting were both extremely high, and may have been difficult to reverse. A research trial in four countries with similar rates of undernutrition was also unable to reduce stunting by an intervention providing either meat or fortified cereals (17). By our calculations, due to the extended period of time required to deliver all training and inputs for both HFP and ENA and the short project life, participating households probably benefitted from the full intervention for only 18-24 months before the end line survey was administered. We do continue to expect that over a longer time frame the combination of improved food access and more optimal nutrition and health practices, the strategy can reduce child stunting, wasting and underweight. Stronger hygiene interventions may also be required.

By contrast, the intervention does appear to have had both a statistically and biologically significant impact on women's underweight and on women's anemia. This finding is especially encouraging because these well-nourished women will be more likely to have healthier pregnancy outcomes in the future. It is plausible that mature, non-pregnant women are biologically more responsive to improvements in dietary intake than are growing children, who have intense nutritional needs and small stomachs. The project also aimed to empower women by targeting them for all training. It may be that their increased production capacity and knowledge also translated to greater control over their nutritional needs. Previous research by HKI has found an influence of the program on women's decision-making authority within the household (18). Further analysis of this dataset will explore whether these associations were at play.

Future research will need to reconsider certain aspects of both program and evaluation design. It is likely that longer a life of project is needed for the intervention to have maximum measurable impact. In Burkina Faso, HKI collaborated with IFPRI on an impact evaluation of the EHFP model using a longitudinal design (following a cohort of children who were 3-12 months at baseline) but over an even shorter project life (three years). This evaluation also found no significant impact, and estimated that a large portion of the children aged out of the critical window before the HFP was fully functional. One possibility would be to retain the longitudinal design, which may have more power to detect impact, but delay baseline data collection until HFP training and input has been delivered and gardens are ready to begin producing, and ensure a longer period of exposure. Another option, suggested by IFPRI, would be to target all women of child-bearing age for program participation and conduct a longitudinal study that enrolls children into the impact evaluation as they are born; this design would require a longer-term program with potentially higher costs.

It is also possible that the EHFP model is not enough to address the malnutrition problems in areas where health and hygiene problems are also highly prevalent, and that the program will need to be coupled with health interventions that address the prevention and treatment of diarrhea, environmental enteropathy and other childhood illnesses. Increased feeding after illnesses is crucial to help developing bodies recover lost growth and nutrients, and may need stronger emphasis. In addition, more substantial support to agriculture may be required, such as investment in systems that improve access to water, extension services and other inputs required to improve production as well as market access. Future analysis of our data will include more in depth examinations of the various pathways to help us better understand this lack of detectable impact on children's growth.



## Appendix 1: LQAS results- Baitadi

Indicators	LQAS 1	LQAS 2			LQAS 3			LQAS 4		
	Aug 2008	Feb 2011			Aug 2011			Mar 2012		
	AAMA (n=159)	AAMA (n=158)	Non AAMA (n=100)	Total (n=258)	AAMA (n=153)	Non AAMA (n=139)	Total (n=292)	AAMA (n=158)	Non AAMA (n=156)	Total (n=314)
Median number of MN-rich vegetables cultivated by HH	5	5	3	4	6	5	6	6	5	5
Proportion of households that own poultry	77.4	68.4	9	45.3	54.2	5.8	31.2	62	22.4	42.4
HHs received technical support from VMF in last month	65.4	70.3	9	46.5	68	10.1	40.4	79.1	18.6	49
Proportion of HFPBs participating in group meeting in last month	78	72.8	NA		68.6	NA		75.9	NA	
Proportion of children aged 6-24 months fed the minimum meal frequency in the last 24 hours	86.5	90.7	81.7	87.3	97.1	91.3	94.8	96.1	94.3	95.2
Proportion of children aged 6-24 months fed food from four or more food groups in the last 24 hours	49.2	62.4	45.1	56.6	77.9	57	69.9	87.6	72.4	80.3
Proportion of children aged 6-24 months fed <b>iron-rich animal source foods</b> in the last 24 hours	25.4	43.3	12.7	33	42.9	5.9	28.4	50.8	31.7	41.5
Proportion of children aged 6-24 months fed any <b>vitamin-A-rich animal source foods</b> in the last 24 hours	77.8	69	53	62.8	84.3	80.6	82.8	90	83.7	87

Proportion of children aged 6-24 months fed <b>iron-rich plant source foods</b> in the last 24 hours	59.5	70.9	52.1	64.6	89.3	63.4	79	90	68.3	79.4
Proportion of children aged 6-24 months fed <b>vitamin-A-rich plant source foods</b> in the last 24 hours	60.9	72.3	53.5	66	92.9	72	84.5	90.8	70.7	81
Proportion of children aged 6-24 months fed <b>eggs</b> in the last 24 hours	17.6	39.7	9.9	29.7	36.4	5.4	24	42.3	19.5	31.2
Proportion of sick children receiving increased breastfeeding during illness	44.4	50	29.7	43.1	73.7	72	73	75	24.2	43.4
Proportion of sick children 6-24 months old fed more or same during illness	46.1	49.2	29.6	43.5	52.7	71.4	58	82.3	56	66.7

## Appendix 2: OR Summary Table

<b>OR Title/Project Name:</b>	Community Randomized Control Trial of HKI's Enhanced Homestead Food Production (EHFP) program in Nepal's Far Western Hills
<b>Report Compiled by (OR Lead Researcher or PI):</b>	Jennifer Nielsen, Ph.D.; Allisa Pries, MA; Akoto Osei, Ph.D., Pooja Pandey, MA; Dale Davis, MA.
<b>Reporting Period:</b>	October 1, 2008 – September 30, 2012
<p><b>Part 1: Overall Summary</b></p> <p>The objective of the research was to test the impact of EHFP targeted to households with children 0-24 months of age on the prevalence of stunting, underweight, wasting and anemia. The EHFP model supports more diversified, year round production of micronutrient-rich crops as well as improved breeds of poultry and ruminants together with nutrition behavior change communications using the Essential Nutrition Actions (ENA) framework to encourage optimal breastfeeding and the consumption of HFP products, especially by vulnerable household members such as pregnant and lactating women and infants and young children. To best capture children's exposure to the program, the researchers chose to examine those 12-48 months of age, based on the assumption that children in this range at endline would have been exposed to the intervention for at least 12 months (estimated to be sufficient duration to benefit) between the ages of 0 and 24 months of age (the critical window). The study was also designed as cross-sectional rather than longitudinal for practical reasons given the narrow age group to be studied. The research intended to test the following hypotheses:</p> <p>Exposure to the HFP+ENA intervention will reduce rates of stunting (length for age &lt;-2SD WHO 2006 reference) by 10 percentage points, underweight (weight for age &lt;-2 SD WHO 2006 reference) by 10 percentage points, wasting (weight for length &lt;-2SD WHO 2006 reference) by 5 percentage points, and anemia by 15 percentage points in intervention compared to control children 12-48 months of age at endline compared to baseline.</p>	
<p><b>Part 2: Major Activities, Process, and Progress</b></p> <ul style="list-style-type: none"> <li>- OR project management and planning activities—see Methods section and timeline.</li> <li>- Research activities see Methods: random assignment to treatment/control; quantitative baseline/endline; qualitative research at baseline to inform behavior change communications (BCC) strategy; four rounds of LQAS process monitoring.</li> <li>- Training: Essential Nutrition Actions, BCC, homestead food production.</li> </ul>	
<p><b>Part 3: Outputs, Outcomes, and Deliverables (i.e., events, products)</b></p> <ul style="list-style-type: none"> <li>- See Timeline.</li> </ul>	

#### Part 4: Discussion of Outcomes, Lessons Learned, and Course Correction

- Evidence of change in practices:
  - Significant increase in developed gardening with more diverse, higher volume production year round, vegetable, fruit and poultry.
    - LQAS and mid-term evaluation identified weaknesses in poultry husbandry although also considerable uptake and enthusiasm that reflected cultural shift away from taboos. Logistical challenges for delivery of vaccines were a major obstacle and solutions were found but not brought to scale in the short project time frame. Lessons learned are being taken forward under USAID-funded *Suaahara* project.
  - Significant reduction in perceptions of food insecurity in treatment compared to control HH.
  - Significant improvements in nutrition knowledge, particularly optimal complementary feeding practices and nutrition during pregnancy.
  - Significant increase in multiple complementary feeding practices in treatment vs. control HH: minimum dietary diversity, quality and acceptable diet; consumption of nutrient rich plant foods and eggs; non-significant improvement in feeding of sick child (small sub-sample may have been unable to detect).
    - Strong evidence that improved food security and access combined with nutrition education and BCC can be translated into more diverse diets for young children in critical window.
  - Significant improvements in women's dietary intake during pregnancy, possibly related to women's empowerment attributable to the project as well as to improved food access and nutrition knowledge.
  - Significant improvement in preventive health practices, particularly in prenatal and postnatal care.
  - Significant reductions in women's underweight and anemia; marginally significant reduction in child anemia. No significant changes in child stunting, underweight or wasting.
    - The project timeframe was very short for this ambitious research question. The intervention is lengthy to mount: requires multiple rounds of training on HFP and ENA, establishment of gardens and growing season before production starts, management of baseline & endline surveys by the implementing agency also took time. Window of exposure within the four year project life (maximum 2 years) may not have been sufficient to influence child growth. Women may biologically more likely to benefit quickly from the model. The diversified food production also appears to contribute to reductions in anemia, even without significant increase in animal source food consumption, but more ASF may be necessary to improve child growth. More extensive hygiene & sanitation strategies that reduce infections and environmental enteropathy (which reduces children's ability to utilize nutrients for growth) may also be needed.

### **Part 5: Supportive Contextual Factors**

- Partnership with the government of Nepal was exceptionally strong at local as well as regional and national levels. The project and the high quality of the country team helped enhance HKI's reputation for nutrition expertise and the government's recognition of the promise of the EHFP model.
- USAID/Nepal contributed an additional \$730,000 to the project, which included a governance component to strengthen multisectoral planning; in particular, to promote joint planning at the local level between agricultural and nutrition departments. This initiative also motivated higher local government ownership of and contributions to the EHFP activities.
- It is also probable that global factors (Scaling Up Nutrition movement; the recognition of the importance of agriculture-nutrition linkages) further encouraged government support for EHFP.
- HKI's local implementation partner, NNSWA, was a strong and dedicated NGO that helped ensure quality on the ground.

### **Part 6: Dissemination and Use of OR Information**

- Formative research results have been thoroughly examined by project staff and have led to numerous adjustments to the EHFP model. Results have also been shared with government partners and USAID/Nepal. The following changes are being implemented under the Suaahara project, which is scaling up the EHFP model to 25 districts across the country:
  - Construction of a poultry coop is a pre-condition for receipt of poultry. A community-based system for delivering poultry vaccines within hill districts is being implemented. Research into cold-chain-free vaccines is being conducted by another stakeholder.
  - Village model farmers are selected on the basis of skills, training and leadership capacity, and sensitivity to ethnicity/economic status.
  - Hygiene and sanitation strategies are strengthened, with attention to hygiene practices, latrine construction and use, reducing other sources of environmental contamination, and exploring physical barriers to protect toddlers from exposure.
  - Ratios of field supervisors to population are increased to ensure quality of implementation and quick resolution of difficulties.

### **Part 7: Contextual Challenges**

- Infrastructure limitations remain substantial in Baitadi. Villages are largely connected by footpaths and markets are distant. Although almost 65% of HH have access to electricity and latrines, the practice of keeping animals within the homestead contributes to environmental fecal contamination, which may have consequences for child health and growth.
- Newcastle (poultry) vaccine supply chains are weak (only wholesale quantities available that exceed the needs and resources at the ward level; distances are great, and cold-chain capacity limited).
- Regular political strikes or *bandhs* periodically disrupted implementation and compounded implementation challenges.

## Part 8: Stakeholder Engagement for Collaboration and support

- HKI has had a remarkable collaboration from both USAID and from the Government of Nepal
  - All key partners (the Ministries of Health and Agriculture and Livestock as well as Local Development, Women’s Affairs and Education; USAID) actively participated in the spectrum of research and project activities (research design; resolving of problems including water constraints, vaccine delivery systems, support for health and agriculture extension). District Agriculture and Health officers actively participated in review meetings and advocated on agriculture and nutrition issues and concerns in the district throughout the OR period.
    - Nepal Health Research Council – provided monitoring on quality of implementation. They also participated in the dissemination workshop for the AAMA Plus and provided valuable feedback
    - USAID provided an additional \$730,000 to support a multisectoral planning component to strengthen government engagement in the project and in developing plans that integrate food security and nutrition strategies to reduce undernutrition. The additional funds also allowed expansion into a third FW region, Bajura.
    - The national government sees the EHFP as a model the merits replication nationwide and is supporting the effort.
    - USAID/Nepal incorporated the model into its Integrated Nutrition Program (now “*Suaahara*,”) which is scaling the EHFP approach across an additional 25 districts (of Nepal’s total of 75), as well as into its Feed the Future initiative, covering an additional 20 districts.
  - The World Bank is also investigating ways to support the replication of EHFP through support to the Government.

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## **Annex 12. Special Publications/Reports**

Please contact HKI if you wish to see any of the publications that have come out of AAMA. Those available at the time of submission of this report are listed in Annex 2.

## Annex 13. Project Data Form

Provided separately.

## Annex 14. Grantee Plans to Address the FE Findings

The comments and recommendations of the evaluator were invaluable to the project team to learn from an objective perspective. The recommendations have provided an opportunity for us to address some important factors and strengthen particular elements of the agriculture, poultry and nutrition in enhanced homestead food production.

### **Interactive learning for essential nutrition actions**

We have now developed a more interactive learning package for the field supervisors, peer educators and female community health volunteers.

- A set of discussion cards is designed to further enhance ENA counseling by providing a range of topics and issues on ENA with methods for stimulating dialogue
- A pictorial booklet has been developed as a counseling aid that will help volunteers recall the key nutrition behaviors and their advantages during household visits and on-the-spot coaching with groups

### **Poultry management**

We have reassessed the poultry management strategy with the help of local poultry experts who have drafted recommendations for poultry management in the mid-upper hills and mountains. Based on the evaluator's comments and our further learning we are:

- Working with the government through the District Livestock Office to establish village campaigns three times a year for vaccination against Newcastle disease along with deworming for all poultry in the district
- Encouraging the improved husbandry of indigenous breeds of poultry at local and district level
- Providing the improved, Nepal-adapted breeds only to households who have prepared acceptable coops and have received orientation on proper feeding and health care practices
- Using an interactive pictorial "coop card" game during the training of homestead food production beneficiaries (HFPB); this training, which was developed by the evaluator, teaches the importance of coops to brood expansion.

### **Village Model Farms**

Village model farms will be established soon after the homestead food production beneficiaries (now defined as all women who are pregnant and/or has a child under two years) have been trained and started their gardens. Village model farmers will be selected from each community based on criteria that includes being an appropriate representative of that community, especially for the most disadvantaged groups; actively participating in the training and HFP establishment; interested in learning additional skills e.g. poultry management, seed production; willingness to support their group of beneficiaries; ready to become an advocate for improving nutrition in women and young children in their community. In order to increase support from family members to HFPBs, male members from the households will also be invited to participate in the training.

### **Nutrient-dense vegetable seeds**

We undertook a review of the most nutrient-dense vegetables and their seasonality and produced a revised planting calendar to maximize the amount of micronutrients available in each season in each homestead garden.

## Annex 15. Grantee Response to Final Evaluation

The insights and technical expertise of the evaluator were invaluable to the project team at both mid-term and at endline. There are a few clarifications HKI would like to make, many of which we believe she would agree to, but which we were unable to communicate before submission.

### **Poultry management**

The project was implemented as a continuing learning process, to test a number of new approaches to EHFP in Nepal, evaluating in real time how they work, and drawing on these lessons to inform a stronger model going forward under the Suaahara project in Nepal and in other countries where HKI works. Process evaluation was conducted using surveys conducted with the LQAS methodology four times over the course of the project, and findings were used for course correction and adjustment of the model. The additional support provided by USAID/Nepal to replicate the model in a third district of the FWR, Bajura, drew directly on these lessons learned. For example, the poultry strategy was revised so that households were required to build a poultry coop prior to receiving their chickens, and additional training was provided to government agriculture and livestock service center providers to that local support for husbandry was reinforced.

After the mid-term evaluation the project team in Baitadi sought to address the challenge of insufficient vaccination services in consultation with the district livestock office (DOLS) by piloting a community-based approach. The strategy improved the supply somewhat, but the government was not able to take it to scale within the remaining life of the project. HKI invited an expert in village poultry production from U.C. Davis, David Bunn, to visit the project sites and advise on further solutions going forward. HKI is following his research in Nepal with Heifer International where he is working with the same poultry breeds as AAMA project used to test a cold-chain-free vaccine for Newcastle disease. If successful, this solution should greatly facilitate vaccine distribution.

We would also note that although the two main breeds of chickens selected were not indigenous, they have been reproduced in Nepal over the past 50 years and are now considered to be fully adapted to the local habitat. They were chosen according to calculations that they would produce more eggs for household consumption. In Suaahara, HKI is indeed giving greater emphasis to improved poultry management. For example, in collaboration with District Livestock Office (DoLS) the project will hold regular vaccination campaigns at community level and partner with DoLS to develop VMFs as a Local Resource Persons (LRPs) for poultry vaccination.

### **Village Model Farms**

HKI has no intention of eliminating the village model farm (VMF), which has been part of its HFP model in Asia since its inception. Under Suaahara we are, however, trying a new approach that defers selection of the village model farmers until after the initial training and start-up of production. The project training team will observe all participants and identify those who are most active, interested and have the strongest teaching skills to be nominated for the position, rather than selecting according to landholding or location criteria.

To support the Suaahara's social inclusion strategy, the VMF selection criteria will include the woman's ability to represent the local community. For example, if the community is predominantly a minority ethnic group or Dalit, then a VMF holder from the same community will be appropriate to serve as their local EHFP representative. This will also allow women from disadvantaged groups the opportunity to develop additional skills. Suaahara will work with many HFP beneficiaries and

identify VMFs from that pool, especially from landless and disadvantaged groups. Each VMF will specialize in one area of production: one will become an expert on poultry production, another will become an expert in seed collection, another will be an expert on food preservation, etc.

### **Communication skills and dissemination of information**

Although the evaluation noted that “AAMA relies on the FCHVs and VMF to convey these messages to the HFPBs who are expected to diffuse the messages to others in the community,” we would like to add that project field supervisors provided on-the-job coaching and mentoring to reinforce the volunteers’ nutrition knowledge and counseling skills. Project supervisors also provided coaching as they practiced the new skills in their IYCF support group meetings with beneficiaries.

### **Data quality**

HKI believes the concerns about data quality may have been overstated. We do not believe that the change in research firms and software between baseline and endline introduced problems in comparability of the data.

HKI does have the data from its contractor PHIDReC to verify that the endline sample was selected using PPS methodology. In Kailali, the selection of additional households from adjacent wards was done randomly only if there were insufficient HHs with children under two in the randomly selected communities to achieve the needed sample size. It was by chance that eight of those wards were AAMA intervention wards.

### **Data analysis**

The internal research team in Nepal, HKI’s Asia-Pacific Regional Office and at headquarters was highly qualified and carried out the research and analysis as planned. It was certainly unfortunate that the national M&E advisor departed just prior to the final evaluation, and HKI did, in fact pursue a “Plan B” as soon as we learned of that staff member’s intended departure. Our country director identified and began negotiating with a candidate to serve for three months and support immediate data analysis needs; however, after prolonged negotiations, this person accepted another offer. We are not sure if it is ever possible to fully prepare for the departure of staff. It was always our intention to have the full data analysis conducted by our experienced Regional Nutrition Advisor, who has a PhD in public health nutrition. We also employed a talented Leland Fellow serving in the regional office to support the analysis, and our experienced, PhD trained, Senior Program Manager at HQ to support the write-up of the findings. It was not possible to provide the final evaluation team with fully cleaned data analyzed with carefully constructed variables and completed multivariate outcomes. The data collection was completed barely three weeks before the arrival of the evaluation team, and analysis of such a complex data set is a process that requires months of work.

Lastly, HKI could not agree more with the recommendation in the report, “The role of supervision using well-thought-out checklists in assuring quality of knowledge and skills transfer must be emphasized. The supervisors should be held responsible for behavior change and adoption of new practices.” We used this approach extensively under AAMA and are continuing to do so in Suaahara.

## Annex 16. Specific Technical Recommendations and Lessons Learned for Replication in Nepal

### Promotion of improved health and nutrition behaviors:

Issue	Recommendation or lesson learned
Quality of sessions	Learning sessions should be creative and practical, using methods to engage the women: hands-on learning for gardens, demonstrations of jaulo and other food preparation or food preservation, games with a learning objective, etc.
Changing social norms	Hold occasional learning sessions for grandmothers to learn about child care and feeding, nutrition during pregnancy and lactation, and preparation of jaulo. Engage fathers in learning about hygiene, nutrition for the family, and HFP.
Specific practices to emphasize	Link hygiene and environmental sanitation closely with ENA Quality and amount of food during and after illness Consumption of animal source foods after formative research to fully understand current beliefs and barriers
Dietary diversity	Assure that field staff know the relative nutrient content of different vegetables and fruits, including local ones. Use games and other activities to reinforce the family's understanding of which foods are most nutritious. Promote consumption of existing local foods that are nutrient dense such as avocado, fruits, green leaves. Use recipes and demonstrations to improve preparation of these foods.
Breastfeeding (Year 3)	Focus on stimulating breastmilk production through frequent and prolonged feedings with less emphasis on mother's nutrition as the solution.

### Vegetable production:

Issue	Solution
Control pests through bio-pesticides	<ul style="list-style-type: none"> <li>• First year- common messages to make bio-pesticide</li> <li>• Following years- pest specific knowledge to VMFs/LRPs eg. Controlling tomato fruit borer.</li> <li>• Development of LRP</li> </ul>
Seed production	<ul style="list-style-type: none"> <li>• Provide simple knowledge to HFPBs about easy crops (self-pollinated crops) onward from first year</li> <li>• Seed production knowledge to VMF of cross-pollinated crops (hardy ones) /develop LRPs with more knowledge</li> <li>• Develop strong linkages among DADO/seed quality control office/seed producers/private organization for production and marketing</li> </ul>
Composting/FYM	<ul style="list-style-type: none"> <li>• Focused FYM improvement (including urine utilization) who have plenty of FYM in their own home</li> <li>• HHs having distance land/garden-focused on composting</li> <li>• Importance of composting to manage domestic waste/ crop waste/ other herbs/weeds</li> </ul>

Waste water management	<ul style="list-style-type: none"> <li>• Focused different techniques during training practically</li> <li>• Practice demonstrations during group meetings</li> <li>• Coordination among line agencies/local government for input</li> <li>• Focused demonstration in dry/summer season</li> </ul>
Irrigation	<ul style="list-style-type: none"> <li>• Coordination with irrigation department/DADO for micro/macro irrigation/ NGO/INGO</li> <li>• Process of group registration at earlier stage of the project</li> <li>• Process of group registration (group should know)</li> </ul>
GESI (DAG)	<ul style="list-style-type: none"> <li>• Pot culture, sac culture</li> <li>• Vine crops could be grown on roofs</li> <li>• Crops grown indoors like mushrooms</li> <li>• Less space required (bees)</li> <li>• GESI focused HFP intervention training, input supply etc.</li> <li>• Positive discrimination/affirmative actions</li> </ul>
Better gardening	<ul style="list-style-type: none"> <li>• Continuous training district to community level</li> <li>• Seed support at the time/last day of training</li> <li>• Focused on district specific seasonal nutrient dense vegetables</li> <li>• Prioritize the nutrient dense vegetables seasonally</li> <li>• Quickly follow up to make good plotting</li> <li>• 2 months for HFP/ENA/EHA follow-up</li> </ul>
Capacity building	<ul style="list-style-type: none"> <li>• 4 days training to VMFs not sufficient for all topics (eg. Seed production, disease control)</li> <li>• From first year on, VMFs/LRPs should provide disease pest control training and capacity building activities</li> </ul>
Multisectoral coordination	<ul style="list-style-type: none"> <li>• MOU at central level</li> <li>• Coordination at each level</li> <li>• Group registration in line agencies like DADO, DLSO, WCDO</li> <li>• Activate NFSSC at district level</li> <li>• Initiate and strengthen ORSP concept</li> </ul>
Year-round food availability	<ul style="list-style-type: none"> <li>• Processing</li> <li>• Value added</li> <li>• Coordination/linkage with sources of assistance</li> </ul>

### **Poultry:**

<b>Issue</b>	<b>Recommendation or lesson learned</b>
Chickens	<ul style="list-style-type: none"> <li>• Focus only on improving management of local chickens. Do not distribute improved breeds because of the high losses and additional requirement of these improved chickens. Simply by care and regeneration of local chickens, egg production will increase.</li> </ul>
Poultry Management as permanent behavior change	<ul style="list-style-type: none"> <li>• On the first year of project, start improving management of local chickens, focusing the good management practices like making strong coop, keeping chickens in a coop with a pen, adequate light, ventilation, proper feeding and water.</li> <li>• ( if some people like GESI(DAG) have no local chicks, provide local hens as affirmative action, if needed). Procure these from the community, not markets.</li> <li>• Chickens kept in a pen will cause less contamination and their manure/droppings will be more readily available for fertilizer. Also, they will lay eggs in the coop.</li> </ul>

Feed	<ul style="list-style-type: none"> <li>• Work with DLSO in each region to create a formula for nutritionally adequate feed based on local ingredients and their seasonal availability. The feed must contain a source of protein like fish or insects.</li> <li>• Through VMFs, increase demand for mineral mix with agro-vet. VMF can buy the packet and divide it among HFPBs who share the cost.</li> <li>• Have strategies for feed in dry season – local grasses, dried grass/hay, kitchen scraps.</li> <li>• Teach about quantity of feed needed as well as quality.</li> </ul>
Coops	<ul style="list-style-type: none"> <li>• Promote building a coop with a pen around it to allow the chickens to come out during the day (minimizes light and space requirements in the coop itself and chickens can eat and get water outside in the pen). The poultry flip chart has good illustrations of coops with pens. Add weeds with soil attached, insects, kitchen scraps, etc. to the pen daily.</li> <li>• Coops must be strong enough to keep out local predators (jackals, mongoose, etc.)</li> <li>• It would be better to demonstrate the different models of coops during community training, if possible or we have to show different models of strong coops in the flip charts and recommend them based on the discussion with community people what are the major predators of poultry in this area and materials of coop construction they have.</li> <li>• Have them think ahead to breeding more poultry, hence, need to make a coop and pen that are big to start with, or ones that can be expanded in size to accommodate increases in the flock.</li> </ul>
Vaccination	<ul style="list-style-type: none"> <li>• To be discussed further with DLSO and the poultry expert from UC Davis. The poultry expert recommends vaccinating only for Newcastle disease: Chicks at 2 weeks and all poultry three times a year (campaigns). May need to develop a national-level committee to work on this issue. Heifer Project is already working with the government on local production of a thermo-stable vaccine for Newcastle. USAID projects need to support this effort with advocacy and ideas for distribution channels, training, etc.</li> </ul>
Hatching	<ul style="list-style-type: none"> <li>• Create a separate space for hatching in the coop or another safe place.</li> <li>• Take eggs away from the hen for two weeks or more to push her to lay more eggs. Some of these eggs can be stored properly to return to her in the nest.</li> <li>• Be careful about the bedding materials, container used and place of hatching along with the number of eggs during hatching. (wood or clay container lined with straw, maize husks, or dried grass is ideal)</li> <li>• Promote cross-breeding between local and improved chickens.</li> </ul>
Brooding	<ul style="list-style-type: none"> <li>• Prepare separate brooding chamber within the same coop or may be separate as per the convenience for better rearing of chicks as well as reduce the chick mortality. Chicks should not be able to escape.</li> </ul>



Egg production	<ul style="list-style-type: none"> <li>• With improved feed, water and care, local hens may lay up to 70 eggs per year and continue laying for 3 or more years.</li> <li>• Nesting boxes should be built in the coops where the hens will lay their eggs in clean straw or grass.</li> <li>• Families (school children help) keep records of eggs laid, and which hens are laying the most eggs. Poor layers can be eaten or sold.</li> </ul>
Incentives	<ul style="list-style-type: none"> <li>• Families and VMFs who adopt good poultry management could be given rewards such as feed or watering container.</li> </ul>

**Training:** The training sequence used for AAMA followed HKI’s established pattern of completing all HFP training before providing the ENA training. Under *Suaahara* HKI will be testing whether delivering ENA training first is more effective, as the roll out of this component can be more rapid than for HFP.

The first training to be held for both components is that of master trainers (project staff and local NGO partners who will serve as overall coordinators of implementation, as well as relevant government partners). This training should be at least 10 days in length and cover all the technical topics related to homestead gardening and poultry management as well as training and supervision skills. Training is implemented in cascade, with this group of master trainers supporting each subsequent level of training.

The next round of training reaches the HFP field supervisors, should also be at least 10 days in length, and involve enough participants to ensure one supervisor for every 6-10 VMFs (again depending on geography). Like the MTOT, this training also covers all the technical topics related to homestead gardening and poultry management but through hands-on practice, as well as training and supervision skills. Supervisors may require refresher training or have access to seasoned staff for help in mastering all aspects of this extensive topic.

The training for mothers’ group members should be at least 5 days in length but delivered in two sessions of 3 and 2 days, respectively, separated by a few months to allow women time to practice the skills and then have them reinforced. Building on this, training for the VMF requires an additional 5-6 days and must cover training skills as well as greater depth in certain technical areas. The VMF will then become the local technical advisor to the mothers’ group members and help them consolidate their production practices.

The training of Master Trainers in ENA should be 12 days in length to allow time to cover the technical material, the practice of counseling for behavior change, and the development of training skills. The schedule is conceived as 3 days of presentations and interactive discussions and role plays, 1 day in the field practicing counseling skills with mothers in the 1,000 day window, 2 days to complete the technical presentations, 1 day returning to the field to conduct a follow-on visit with the mothers, then 6 days to practice training and reinforce knowledge and skills. The participants should be project coordinators and government partners (potentially from both local and national levels).

The next level is a 7-day training of trainers for field supervisors. This takes 5 days, covering the technical content and supervision techniques (always with active learning methods and role plays) and 2 days practicing the counseling skills with mothers. This training can be extended to, *inter alia*, government partners in health, agriculture, education, social development, local development, and local water and sanitation committees.

At the community level, training for Female Community Health Volunteers (FCHVs) and village model farmers (VMFs) should be a 4-day program that covers technical content, BCC techniques, and allows one day for action planning and skills in facilitating group discussions of ENA topics. These trainees will become responsible for convening monthly meetings of the mothers' groups to reinforce understanding and practice of ENA and to encourage members to share their new knowledge and habits with other mothers (and grandmothers and fathers) in the community. This training could also include teachers and staff of the Ministry of Education; farmers group members; and others as warranted.

Lastly, the mothers' group members are given a 2-day orientation to ENA with emphasis on the ties to HFP, training that will be reinforced by monthly meetings.

## Annex 17. Summary Tables

**Table 1: Summary of Major Project Accomplishments Kailali and Bajura Districts**

Result 1: Increased year round accessibility of micronutrient-rich foods for children < 2 and for pregnant and lactating women.			
Project Inputs	Activities	Outputs	Outcomes
<b>VMF/FCHV Selection</b>	<ul style="list-style-type: none"> <li>- Coordination with Health facility and VDC</li> <li>- Meeting with FCHV for VMF selection</li> <li>- VMFs chosen based on selection criteria</li> </ul>	<ul style="list-style-type: none"> <li>- Kailali: 3 VMF in each VDC : Total 126 VMF in Kailali district</li> <li>- Bajura: 5 VMF in each VDC: Total 135 VMF in Bajura</li> </ul>	<ul style="list-style-type: none"> <li>- 89.5% of families with children under age two in Kailali now have gardens and 77.4% have poultry with an average of seven varieties of vegetable and ten chickens in their garden</li> </ul>
<b>HFPBs</b>	<ul style="list-style-type: none"> <li>- Coordination and data collection with FCHV</li> <li>- Coordination with VMF/FCHV</li> </ul>	<ul style="list-style-type: none"> <li>- Kailali: 30 - 40 HFPBs in each ward : Total 4,632 Beneficiaries in Kailali</li> <li>- Bajura: 15-30 HFPBs in each VMF: Total 3412 HFPBs in Bajura</li> </ul>	
<b>Poultry distribution</b> 2,520 chickens to VMF; chicken coops built; 16,565 hens to HFPBs	<ul style="list-style-type: none"> <li>- Training on HFP</li> <li>- Building poultry coop</li> <li>- Distribution of poultry</li> <li>- Supervision</li> </ul>	<ul style="list-style-type: none"> <li>- Kailali: 4,758 people trained 57.5% VMFs selling eggs and chicks</li> </ul>	<ul style="list-style-type: none"> <li>- 72.7% of families with children under two in Bajura District have gardens and 66.2% have poultry with an average of six varieties of vegetable and three chickens in their garden</li> </ul>
2025 chickens to VMF; chicken coops built 17060 chickens to HFPBs		<ul style="list-style-type: none"> <li>- Bajura: 3547 people trained 12.1% VMFs selling eggs and chicks</li> </ul>	
<b>Project Inputs</b>	<b>Activities</b>	<b>Outputs</b>	
<b>Seed distribution</b> seeds distributed	<ul style="list-style-type: none"> <li>- Training</li> <li>- Distribution</li> <li>- Supervision</li> </ul>	<ul style="list-style-type: none"> <li>- Kailali: 126 VMFs trained in basic gardening</li> <li>- 4617 trained HFPBs</li> <li>- 126 VMF gardens established</li> </ul>	
seeds distributed		<ul style="list-style-type: none"> <li>- Bajura: 135 VMFs trained in gardening</li> <li>- 3412 HFPBs trained</li> <li>- 135 VMF garden established</li> </ul>	
HFP Handbooks for field supervisors HFP Handbooks for VMF Poster of seasonal planting Schedule of key HFP messages for VMF Seasonal calendars flyers on specific crops	<ul style="list-style-type: none"> <li>- Distribution of materials along with trainings</li> </ul>	<ul style="list-style-type: none"> <li>- VMFs have basic knowledge</li> <li>- Supervisors have a resource from which to learn and to provide further training to VMFs</li> </ul>	

**Table 2: Summary of OR Accomplishments in Baitadi District**

Result 1: Increased year round accessibility of micronutrient-rich foods for children < 2 and for pregnant and lactating women.			
Project Inputs	Activities	Outputs	Outcomes
<b>VMF/FCHV Selection</b>	<ul style="list-style-type: none"> <li>- Coordination with Health facility and VDC</li> <li>- Meeting with FCHV for VMF selection</li> <li>- VMFs chosen based on selection criteria</li> </ul>	<ul style="list-style-type: none"> <li>- 6 VMF in each VDC: Total 122</li> </ul>	<ul style="list-style-type: none"> <li>- <b>97.6%</b> of families with children under two in intervention areas of Baitadi District have gardens and <b>29.1%</b> have poultry with an average of <b>eight</b> varieties of vegetable and four chickens in their garden</li> </ul>
<b>HFPBs</b>	<ul style="list-style-type: none"> <li>- Coordination and data collection with FCHV</li> <li>- Coordination with VMF/FCHV</li> </ul>	<ul style="list-style-type: none"> <li>- 20 – 40 HFPBs in each VMF</li> <li>- 3,329 HFPBs</li> </ul>	
<b>Poultry distribution</b> 2,440 chickens to VMF 126 chicken coops built 16,255 chickens to HFPB	<ul style="list-style-type: none"> <li>- Training on HFP</li> <li>- Building poultry coop</li> <li>- Distribution of poultry</li> <li>- Supervision</li> </ul>	<ul style="list-style-type: none"> <li>- 3,451 people trained</li> <li>- 65% VMFs selling eggs and chicks</li> </ul>	
Project Inputs	- Activities	- Outputs	
<b>Seed distribution</b> seeds distributed	<ul style="list-style-type: none"> <li>- Training</li> <li>- Distribution</li> <li>- Supervision</li> </ul>	<ul style="list-style-type: none"> <li>- 122 VMFs trained in gardening</li> <li>- 3329 HFPBs trained</li> <li>- 122 VMF garden established</li> </ul>	
HFP Handbooks for field supervisors HFP Handbooks for VMF Poster of seasonal planting Schedule of key HFP messages for VMF Seasonal calendars flyers on specific crops	<ul style="list-style-type: none"> <li>- Distribution of materials along with trainings</li> </ul>	<ul style="list-style-type: none"> <li>- VMFs have basic knowledge</li> <li>- Supervisors have a resource from which to learn and to provide further training to VMFs</li> </ul>	