Clinton Health Access Initiative

Reducing Malnutrition and Increasing Agricultural Incomes through Local Production of Complementary Foods

2015 Report

CLINTON HEALTH ACCESS INITIATIVE

Table of Contents

A. Executive Summary 2

B. Introduction and Context 3

C. Output Review 5

Output 1: Companies established with financial model that enables quality, nutritious complementary food product to be accessible to the poor 5

Output 2: Farming cooperatives / unions equipped to engage effectively with the production of a high quality, nutritious complementary food 8

Output 3: Supply chain for getting complementary food product from factory to homes is efficient and effective 18

Output 4: Demand, uptake and consumption of complementary food product by the poor is optimal 21

Output 5: Evidence is generated on the effectiveness of the complementary food product to inform replication of the approach in other contexts 23

D. Value for Money 26

E. Risk Management 28

F. Monitoring & Evaluation 30

G. Sustainability and Exit Planning 33

Annex: Framework for Program Monitoring, Evaluation, and Reporting 34

A. Executive Summary

During 2015, the Clinton Health Access Initiative (CHAI) and partners achieved several key milestones in the nutrition program, *Reducing Malnutrition and Increasing Agricultural Incomes through Local Production of Complementary Foods*. The Government of Rwanda (GoR), with a consortium of international investors led by Royal DSM and including the International Finance Corporation, s9(2)(ba) and the s9(2)(ba) , has launched a joint venture to produce nutrient-dense complementary and supplementary foods. The joint venture, Africa Improved Foods Ltd. (AIF), has incorporated an operating company in Rwanda with an s9(2)(b)(ii) initial investment of million to launch a s9(2)(b)(ii) metric ton factory. AIF broke ground on factory construction in December 2015. The Government of Ethiopia (GoE) is finalizing s9(2)(b)(ii) s9(2)(b)(ii)

CHAI initiated agricultural activities in Rwanda during the 2014-15 season, driving a procurement planning process across project stakeholders, setting up a revolving loan facility, and providing extension support to partner cooperatives. Forward contracts were used for the first time in Rwanda, and the lessons learned through this initial pilot season have been critical for program planning. In preparation for the 2015-16 season, CHAI reworked the extension support model in collaboration with local government partners, and identified key areas for technical assistance with the New Zealand Ministry of Foreign Affairs and Trade. Across the 2014-15 and 2015-16 seasons, CHAI supported more than 15,500 farmers with improved agricultural technologies in Rwanda.

In Ethiopia, CHAI used data from an assessment of potential partner cooperatives and unions to design targeted trainings for cooperative and union leadership. CHAI held a training of trainers for 40 local government partners, with follow-on cascade trainings reaching 205 cooperative leaders. This capacity-building work will lay the groundwork for strong partnerships in the 2016-17 agricultural season in Ethiopia, when procurement of maize and soybean is expected to begin.

CHAI continued to collect quarterly data from households enrolled in the baseline cohort study in Rwanda during 2015. To strengthen the study, CHAI received approval for a protocol revision to collect data on mothers' height and weight. Following an expert consultation in December 2015, CHAI will also assess the cost of adding micronutrient status to the Rwanda study as an outcome measure. In the last quarter of the year, CHAI brought on a technical advisor to develop potential impact evaluation designs for the project in Ethiopia, resulting in a prioritized short-list of options for a rigorous study design.

Delays in the formation of the joint venture posed a significant challenge in 2015. One partner in the consortium of investors formed during 2014 backed out of the partnership early in the year, necessitating the formation of a new group of partner investors. While CHAI was able to identify new investors to enter the deal on the agreed terms, the change delayed joint venture formation in both Rwanda and Ethiopia. This in turn pushed back the timelines for the other programmatic work streams, which are contingent on factory launch. Going into 2016, CHAI will carefully monitor progress against construction timelines, and keep program stakeholders coordinated to prepare full launch plans for product distribution and education campaigns in both countries.

B. Introduction and Context

With support from the s9(2)(ba) Foundation, the New Zealand Ministry of Foreign Affairs and Trade (MFAT), and the U.K. Department for International Development (DFID), CHAI is undertaking a multi-country effort to rapidly reduce the incidence of chronic malnutrition, or stunting, in children under five. In many of CHAI's partner countries, more than 40% of children are stunted, resulting in impaired cognitive development and weakened immune systems. Stunting is the single greatest predictor of death in children under five and is associated with 45% of child deaths, contributing to 3.1 million deaths annually.[1] Stunting rates increase steeply for children between six months and two years of age, when breastfeeding alone does not provide adequate nutrients to support healthy growth and development, and many households struggle to access high-quality complementary foods.

CHAI has worked with partners, including the World Food Program (WFP) and Royal DSM, to develop a nutrient-dense fortified blended food (FBF) that can be produced locally, is based primarily on local agricultural products, and is aligned with local eating habits. The formulation is specifically designed to fully meet the nutrient needs of 6-23 month olds, who should both breastfeed, when possible, and receive a high-quality complementary food. The formulation is based on WFP's SuperCereal Plus, and contains maize, soybeans, soybean oil, sugar, skim milk powder, and a micronutrient blend. While processed complementary foods are available on the commercial market in CHAI's partner countries, these products often lack key macro- and micro-nutrients, do not have sufficient quality controls, and/or are not affordable to the populations that need them most.

To enable long-term sustainability, CHAI and partners have developed a commercially viable business model for local production of FBF s9(2)(b)(ii) The business model allows for s9(2)(b)(ii) for subsidized distribution to poor and vulnerable groups, who tend to have the highest rates of stunting. Local production both enables affordable product access and promotes the development of national food processing industries, adding value to staple crops and opening new avenues for export growth. CHAI is facilitating the launch of local joint ventures to produce FBF under this business model with investor funding, separate from the donor funds supporting CHAI. New ("greenfield") factory construction is being pursued for production as this compares favorably in cost to retrofitting existing facilities.

By procuring maize and soybean for FBF production in-country, the project supports agricultural sector growth and provides a market for smallholder farmers, who comprise a significant portion of the population in CHAI's partner countries. Improving farmers' yields and incomes through guaranteed sales of quality maize and soybean to the factory is a central goal of the project. CHAI is facilitating relationships between cooperatives of smallholder farmers and the new joint ventures to form mutually beneficial, long-term contracting arrangements. Because access to affordable credit is a significant constraint for farmers, CHAI has worked with the International Finance Corporation to develop a revolving loan fund to support farmers' cash requirements during the long growing season, with

[1] Black, R, et al. *Maternal and child undernutrition and overweight in low-income and middle-income countries.* The Lancet, published online June 6, 2013.

repayment at the time of crop sales to the local production facilities. In cooperation with the relevant government partners, and with both technical and financial support from MFAT, CHAI is strengthening extension support for partner cooperatives, thereby improving the transmission of best practices to maximize yields and crop quality. Finally, CHAI is facilitating improvements to harvest and post-harvest infrastructure, with the goal of reducing post-harvest losses and maximizing farmers' marketable yields.

CHAI will work with government partners to develop product distribution and promotion systems to drive uptake and appropriate product use at the household level. The product can be prepared as a porridge, which is aligned with current feeding habits for 6-23 month olds. CHAI will support government-led campaigns to promote exclusive breastfeeding in the first six months, and continued breastfeeding through the first two years. CHAI is also reviewing the need for interventions to support maternal nutrition and/or to improve water, sanitation and hygiene (WASH) practices at the household level, with potential to incorporate additional interventions into the project.

A rigorous monitoring and evaluation plan is critical to understand the project's impact on nutritional status and to course correct as needed. CHAI has initiated a cohort study in Rwanda to compare anthropometric outcomes among children before and after product launch, and between children with higher and lower uptake of the FBF after product launch. In Ethiopia, CHAI is considering a short-list of potential evaluation designs with support from technical experts. In both countries, CHAI has established a monitoring system to track progress in agricultural activities, and will be creating systems to monitor distribution and product uptake metrics to begin at the time of product launch.

CHAI is undertaking the initial phase of this project in partnership with the Governments of Rwanda and Ethiopia. Both countries are deeply concerned about the impact of chronic malnutrition on their human and economic development, and have a track record for rapidly implementing promising new programs. Over the coming years, CHAI will look at the potential to expand the program to up to five new countries in Africa s6(a) New program countries could adopt the same model as the initial phase, or adapt the approach to suit their context. CHAI will be assessing the potential for expansion to s6(a) during 2016.

C. Output Review

Output 1: Companies established with financial model that enables quality, nutritious complementary food product to be accessible to the poor

Indicator	Target in 2015	Achieved by December 2015	Target by 2016
Indicator 1.1 Joint venture agreements in place with government partners, s9(2)(b)(ii) s9(2)(b)(ii)			
	Legal agreements in place in Rwanda and Ethiopia between national company and government s9(2)(b)(ii) s9(2)(b)(ii) s9(2)(b)(ii) s9(2)(b)(ii)	Legal agreement has been signed to form Africa Improved Foods, Ltd. in Rwanda, s9(2)(b)(ii) s9(2)(b)(ii) s9(2)(b)(ii) Final negotiations are underway to sign the legal agreement in Ethiopia.	Term sheets in place in phase 2 countries between Holding Company and governments
Indicator 1.2 Government purchase volumes (MT)			
	N/A	N/A	N/A

Progress towards output

Despite facing delays early in the year, the formation of companies to produce high-quality, nutrient-dense complementary foods in Rwanda and Ethiopia made substantial progress in 2015. An international holding company comprised of the private investors in the project has been formed and registered s9(2)(b)(ii) , and a full legal agreement has been signed between the holding company and the Government of Rwanda to launch a local joint venture in Rwanda. The holding company and the Government of Ethiopia are in the process of finalizing a similar legal agreement laying out the structure of the joint venture in Ethiopia, with signatures expected in early 2016.

Holding Company Incorporation

In the second quarter of 2015, one of the planned investors in the project – s9(2)(b)(ii) (s9(2)(b)(ii) – opted out of the partnership structure after several months of negotiation, delaying the formation of the international holding company to invest in local production facilities. The s9(2)(ba) s9(2)(ba) (s9(2)(ba) and the s9(2)(ba) ( ) agreed to s9(2)(ba) s9(2)(b)(ii) replace in the holding company structure, with the understanding that the new parties would accept the same terms previously negotiated with the Government of Rwanda. Royal DSM is the sole strategic investor and operating entity under the revised structure, with a share, and IFC are s9(2)(ba) each taking a share in the holding company, while s9(2)(ba) is taking a s9(2)(ba) share. All Board approvals for the new structure have been secured, and the company, Africa Improved Foods Ltd. (AIF), has been registered s9(2)(b)(ii) . AIF formed a Board of Directors comprising members of the

shareholders, with CHAI as a Board Observer. The first AIF Board Meeting took place in September 2015. In addition, AIF hired a full management team, comprising a CEO, CFO and COO, all of whom had been involved in the negotiations as representatives of DSM for several months.

Joint Venture Formation in Rwanda

The negotiations between the Government of Rwanda and the holding company were completed and AIF signed a joint venture agreement with the Government of Rwanda in the third quarter of 2015. The legal agreement captures the parties' commitments s9(2)(b)(ii) s9(2)(b)(ii) as laid out in the term sheet that was signed in 2014. The joint venture has been registered in Rwanda as Africa Improved Foods Ltd. Importantly, the JV agreement captures an innovative profit-sharing mechanism whereby the Government of Rwanda will receive s9(2)(b)(ii) s9(2)(b)(ii) helping to offset distribution costs and allowing for a subsidy scheme to reduce the product cost in lower-middle income groups. This pool of funding will be separate from the Government's commitment to fully fund coverage of the poorest households.

In parallel with joint venture formation, AIF initiated the process of factory construction in the third quarter of 2015, approving an order of food processing equipment from s9(2)(b)(ii) and contracting an Engineering, Procurement, and Construction Management (EPCM) company, s9(2)(b)(ii) , to develop detailed engineering plans. CHAI provided support for the process of transferring the selected land site from the Government of Rwanda to AIF, resulting in AIF breaking ground on construction in the fourth quarter of 2015. CHAI has also been working with AIF and the Ministry of Education to connect with local universities and technical schools so that AIF can obtain the necessary human resources locally to operate the factory. The timeline for factory construction and commissioning is 11-13 months, putting the estimated date of product launch in the fourth quarter of 2016.

Facilitation of Joint Venture Negotiations in Ethiopia

CHAI worked closely with AIF and the Government of Ethiopia during 2015 to facilitate s9(2)(b)(ii) s9(2)(b)(ii) culminating in two productive negotiation sessions. CHAI has provided ongoing technical support to finalize the agreement, responding to questions and concerns from all parties, ensuring that the agreement terms are well understood, and adding clarifications within the agreement as needed to smooth the process. At the request of Government partners, CHAI prepared a detailed document describing the proposed profit-sharing arrangement as well as s9(2)(b)(ii) s9(2)(b)(ii)

s9(2)(b)(ii) CHAI also provided continuous support to AIF to refine the business model with updated data s9(2)(b)(ii) This support paved the way to focus discussions with the Government of Ethiopia on a shortlist of key negotiation points. CHAI has helped to progress these points through the appropriate government channels. With this support, the negotiation points are in the process of being resolved, and the joint venture agreement is on track for signature in early 2016.

In collaboration with the Ethiopian s9(2)(ba) , CHAI provided support to the JV partners to secure an appropriate land site for the establishment of the first plant in the vicinity of Addis Ababa. With AIF, CHAI conducted detailed assessments at two proposed Industrial Zone sites, s9(2)(b)(ii) and s9(2)(b)(ii) . The assessments included availability of land, incentives, location, and availability of infrastructure such as roads, electricity, and water. Based on this assessment and follow-up discussions, s9(2)(b)(ii) s9(2)(b)(ii) s9(2)(b)(ii) as the preferred location for the first processing plant. AIF and the s9(2)(b)(ii) owners of the held a series of discussions regarding the cost, infrastructure and identification of a potential plot within the zone to establish the plant. The selected land site has access to infrastructure already in place, so the construction timeline should be similar to Rwanda (11-13 months).

Challenges and Lessons Learned

Reaching agreement on the holding company formation across partners proved significantly more time consuming than originally anticipated, delaying formation of the joint venture across both Rwanda and Ethiopia. s9(2)(ba)

s9(2)(ba)

Streamlining the structure with a single lead investor should allow the project to move forward more quickly in new settings.

While the joint venture discussions proved quite time-consuming in Rwanda, the negotiations produced a final joint venture agreement that serves as a time-saving template for expansion to new countries. This has already proven useful in the negotiations in Ethiopia, where the Government has been open to reviewing and adapting the Rwanda agreement, rather than developing an entirely new document that would in turn require further negotiations and legal advice. This has enabled CHAI and AIF to focus discussions on key substantive issues in the agreement, and reduce the time required for routine legal reviews. As CHAI explores expanding the project to new countries, the use of the Rwanda agreement as a template should likewise accelerate the timeline for moving from agreement on the project term sheet to a signed joint venture agreement.

Output 2: Farming cooperatives / unions equipped to engage effectively with the production of a high-quality, nutritious complementary food

Indicator	Target in 2015	Achieved by December 2015	Target by 2016
Indicator 2.1 Percent of partner cooperatives provided with support to procure high-quality post-harvest infrastructure (dry sheds, storage, and pavement)			
	N/A	N/A	40% Rwanda
			N/A Ethiopia
Indicator 2.2 Percent of total maize and soybean volumes required for production procured locally			
	N/A	N/A	50% Rwanda
			N/A Ethiopia
Indicator 2.3 Percent of maize and soybean volumes produced for JV by partner cooperatives meeting quality standards			
	70% Rwanda	92% of maize delivered to the factory met the quality standards in Rwanda	80% Rwanda
	N/A Ethiopia	N/A Ethiopia	N/A Ethiopia
Indicator 2.4 Percent of partner cooperatives aligned with national gender policies			
	80% Rwanda	89% of the project's partner cooperatives in Rwanda were aligned with national gender policies	80% Rwanda
	N/A Ethiopia	N/A Ethiopia	N/A Ethiopia
Indicator 2.5 Total smallholder farmers reached with improved agricultural technologies			
	12,000 Rwanda	15,622 farmers were reached in Rwanda (6,118 women and 9,504 men)	12,000 Rwanda
	N/A Ethiopia	N/A Ethiopia	N/A Ethiopia

Progress towards output

During the main 2014-15 season in Rwanda ("2015 Season A"), CHAI facilitated an initial round of maize procurement through forward contracting between nine partner cooperatives in the Eastern Region and the joint venture. This represented the first time forward contracts were used in Rwanda, and the experience was valuable to all stakeholders. The quality of the maize that the cooperatives delivered to the factory was very high, with a 92% acceptance rate and only two rejections due to high aflatoxin levels. As noted above, nearly all of the partner cooperatives were aligned with national gender policies (89%), supporting the program's equity goals. However, of the 10,500 MT of maize contracted by s9(2)(b)(ii) on behalf of the joint venture, only approximately 2,200 MT of maize was delivered (~20%). Ultimately, the infrastructure capacity in place both at cooperatives and in the logistics of transporting crops to the factory was insufficient to manage the maize volumes produced at appropriate quality levels, particularly drying the maize down to the required moisture content. These difficulties were combined

with a subsequent early series of rainy periods which threatened the remaining maize left in the fields. When the maize was not transported to the factory as quickly as anticipated, market prices rose above the contract price and CHAI released the farmers to sell at these higher prices.

Given that the factory will not launch until late 2016, after the next maize harvest, the shortfall in procurement does not pose a risk to the project. This pilot season was pivotal in testing how well the systems in place could handle the entire cycle including planting, harvesting and eventual sale of the crop to the factory. The lessons learnt during the season (see Box 1) have been invaluable in helping CHAI and partners plan for the upcoming maize season ("2016 Season A"). CHAI has made a number of targeted changes in the program in response to the feedback received during the 2015 pilot.

In Ethiopia, CHAI carried out a variety of activities aimed at strengthening cooperatives and unions in 2015. CHAI undertook capacity gap assessments with selected primary cooperatives as well as cooperative unions, and then provided capacity-building trainings to ensure that the supply of maize and soybean will meet quality standards. CHAI continued to explore potential partner institutions to establish affordable means of financing for partner farmers, and initiated a partnership with a soybean network, s9(2)(ba), to ensure that partner farmers are able to access the best available resources for seed and other technologies.

Cooperative Strengthening

In both Rwanda and Ethiopia, CHAI worked with local government partners to identify strong cooperative partners for the coming seasons. Cooperatives are selected on the basis of land size, agronomic suitability for maize and soybean production, previous experience with contracting, alignment with government registration requirements, and interest in participating in the program, among other criteria. In Rwanda, cooperatives' success in participating in the 2015 pilot influenced their inclusion for 2016 Season A. As shown in Table 1, six of the nine cooperatives from 2015 Season A are participating in the upcoming 2016 Season A, along with two new cooperatives. In Ethiopia, a total of eleven unions, consisting of 66 primary cooperatives, have been pre-selected for potential partnership in the 2016-17 season. Forward contracts will be signed seasonally with a subset of unions, based on the unions' capacity and AIF maize and soybean demand.

Table 1: Farmers accessing improved agricultural technologies in 2015 – Rwanda

Cooperative Name	Registered Members		Affiliates		Total – By Gender		Total
	Female	Male	Female	Male	Female	Male	
s9(2)(b)(ii)	521	978	485	745	1,006	1,723	2,729
	183	221	145	171	328	392	720
	162	568	0	0	162	568	730
	464	619	0	0	464	619	1,083
	104	169	0	0	104	169	273
	413	341	0	0	413	341	754
	1,521	2,100	0	0	1,521	2,100	3,621
	887	924	0	0	887	924	1,811
	17	97	183	215	200	312	512
	14	36	802	1,486	816	1,522	2,338
	61	384	156	450	217	834	1,051
Total	4,347	6,437	1,771	3,067	6,118	9,504	15,622

2015 Season A

2016 Season A

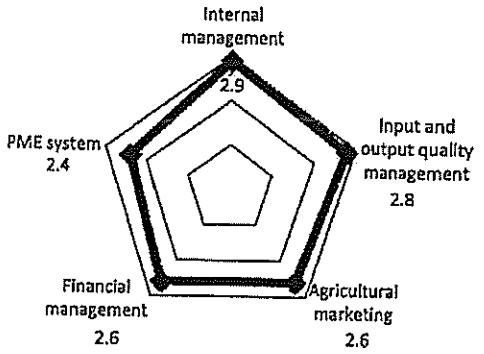
Cooperative assessments completed

For the partner cooperatives selected in both countries, CHAI worked with the International Finance Corporation (IFC) to conduct assessments of cooperative capacity through a specialized rating agency, s9(2)(ba) The assessments examine cooperative strengths and weaknesses across nine dimensions, allowing cooperative leadership and partners to target development according to key weaknesses identified, as well as track progress over time. The resulting profiles can also be used to communicate with service providers, such as financial institutions. In addition to the s9(2)(ba) assessments, which were conducted for cooperatives in Rwanda and unions in Ethiopia, CHAI undertook assessments of primary cooperatives in Ethiopia in partnership with the s9(2)(ba) and local NGOs. The results indicate that the primary cooperatives have strong practices in cooperative internal management and governance, with low scoring in M&E systems, marketing and financial management (see Figure 1).

Cooperative-level trainings in Ethiopia

In Ethiopia, CHAI used the results of the assessments to organize training sessions with management from primary cooperatives and unions in order to build capacity as strong market actors. The major topics covered included: internal cooperative management and leadership, grain quality management, value chain development, business plan development and Planning, Monitoring and Evaluation (PME) systems. The trainings were provided at two levels, starting with a training of trainers (ToT) and then continuing

Figure 1: Primary Cooperative Assessment Results in Ethiopia



with cascade trainings. The participants in the ToT in turn trained cooperative extension workers and cooperative executive committee members on similar topics. In total, 13 zonal and district cooperative staff, 19 union staff, 40 cooperative extension workers and 205 primary cooperative executive committee members were trained. The ToT was organized for union and cooperative promotion office staff by mobilizing government and non-governmental organizations' expertise. Based on partners' previous experiences with agriculture trainings in Ethiopia, CHAI adopted a 'learning by doing' approach of tailoring capacity-building interventions to local situations and to the specific skill gaps outlined in the assessment.

Table 2: Potential partner cooperatives and member farmers in Ethiopia

Union Name	Primary Cooperatives	Male members	Female members	Total
s9(2)(ba)	6	1,886	544	2,430
	6	2,403	176	2,579
	6	3,012	289	3,301
	6	6,592	663	7,255
	6	3,046	246	3,292
	6	1,529	260	1,789
	6	2,868	173	3,041
	6	2,606	512	3,118
	6	1,080	228	1,308
	6	5,631	637	6,268
	6	1,888	246	2,134
Total	66	32,541	3,974	36,515

Strengthening extension support in Rwanda

In Rwanda, CHAI used the results of the 2015 pilot to develop an improved system for farmer support for 2016 Season A. CHAI worked with the leadership at the Eastern Province to embed extension support within the appropriate local government agencies, seconding dedicated extension agents to each of the sectors where a partner cooperative is located. This allows the extension officers to work closely with sector and district agronomists, and share experiences during weekly management meetings. The linkage is widely extended to other institutions that are playing a part in improving agricultural practices and cooperative management, including the Rwanda Agricultural Board (RAB), the Rwanda Cooperative Agency (RCA) and local banks. The extension agents are responsible for training farmers in Good Agricultural Practices (GAP), monitoring input distribution, providing support during the harvest and post-harvest period, and facilitating access to loans. The extension officers work through the existing cooperative structure to reach the cooperative members, giving technical advice to the leaders of farmer groups who then pass on extension support to farmer group members. CHAI has seconded eight extension officers to the sectors corresponding to each partner cooperative for 2016 Season A, with agreement that these officers will ultimately be absorbed by local government.

Contract negotiations in Rwanda

In response to feedback from cooperatives regarding the forward contracts from 2015 Season A, CHAI worked with the Ministry of Agriculture and Animal Resources (MINAGRI) and local government partners to allow time for discussion of quality requirements and pricing terms leading up to the contracting between AIF and the selected cooperatives for 2016 Season A. CHAI worked with the AIF team to build out several potential scenarios for maize pricing, which were subsequently discussed with cooperative leadership. The parties agreed that s9(2)(b)(ii)

s9(2)(b)(ii)

Box 1: Lessons Learned during 2015 Pilot in Rwanda

Key Challenge	Proposed Solution
Lack of logistics capacity to move maize from farm to factory after the harvest	The joint venture will directly manage the logistics of moving maize from farm to factory, procuring transport in advance
Lack of throughput capacity in post-harvest infrastructure at the cooperative level	CHAI and the Post-Harvest Task Force will develop cooperative-level infrastructure plans to address gaps in capacity
Lack of contract experience within partner cooperatives	The joint venture will work closely with local government to sensitize cooperatives on contract terms and develop mutually agreed pricing
s9(2)(b)(ii)	CHAI, MINAGRI and the Government of the Eastern Province developed an improved extension model centered around embedding staff at the sector level within local government
Best practices for maize production and post-harvest management were not consistently applied	CHAI and MFAT will work with technical assistance providers to strengthen the delivery of best practices to the farmer

Technical support for extension teams

In close collaboration with the New Zealand Ministry of Foreign Affairs and Trade, CHAI worked with DAI Inc. during 2015 to develop technical assistance plans to support the extension teams in both Rwanda and Ethiopia. A team of lead consultants visited both countries to understand the landscape, visit the partner cooperatives, and draw up a tentative work plan for a three-year period of technical support. The technical support will focus on developing tools for extension agents and lead farmers to convey agronomy trainings to fellow farmers, building the teams' capacity to effectively relay information and drive uptake of Good Agricultural Practices. The DAI team will also provide support on soil analysis to determine appropriate input packages, help evaluate mechanization options, and improve the project's

measurement tools to effectively track progress. Depending on the results of a more detailed review in 2016, the DAI team may also help to implement an electronic platform for extension support. Implementation against this technical assistance work plan will begin in early 2016.

Gender equity

A key component of the agricultural work has been striving to ensure that women are an integral part of the agricultural process so that they harness the economic benefits of this project. Rwanda has progressive gender policies in place, and 89% of the cooperatives are aligned with national gender guidelines, with at least 30% of their membership listed as female. Overall, 42% of the members of the 2015 Season A partner cooperatives were female. Female participation in farming cooperatives in Ethiopia is much lower, with just over 10% of the members of partner cooperatives in Ethiopia listed as female. In Ethiopia, women who are married to male cooperative members can access agricultural inputs, but are excluded from participating in training sessions and cannot benefit from any profit-sharing schemes. In Rwanda, CHAI will strive to ensure that the high participation rates of women are maintained throughout the duration of the project and beyond; while in Ethiopia, CHAI and its partners will work to design interventions to increase female membership by 20%, in line with Ethiopia's Agricultural Cooperative Sector Development Strategy 2012-16.

Access to Financing

During 2014, CHAI developed an innovative financing model to ensure that farmers had access to low cost credit for their input needs and to help them manage their operational costs without adversely affecting their savings. This financial model was designed to minimize lending risks and build confidence and trust between the lending institution, suppliers, and farmers, therefore assuring the sustainability of the project in future years. The model utilizes forward contracts with the joint venture as collateral to reduce the bank's risk; directs funding from loans as payments directly to input suppliers, to reduce the risk of diversion of funds; and directs repayments from the joint venture to the local bank to pay off outstanding loan balances as crops are received during the harvest. Following extensive discussions with local banks, the s9(2)(b)(ii) (s9(2)(b)(ii)) was selected to act as the local lending partner in Rwanda, agreeing to provide loans at an interest rate of well below the prevailing 20-25% rates.
s9(2)(b)(ii)
s9(2)(ba), s9(2)(b)(ii)

Access to financing did increase considerably among the partner cooperatives for the 2015 Season A in Rwanda, from 30% at baseline to more than 70% in 2015. In total, the cooperatives repaid 84% of the loans from CHAI during 2015, with significant variation in repayment rates across the cooperatives. Overall, the repayment rate was lower than expected because only a portion of the forward contracts

were fulfilled, for the reasons discussed above: with the price of maize rising after the 2015 harvest and the maize volumes not urgently needed for production, the cooperatives were released from the contracts to sell maize on the open market. While this was advantageous for the cooperatives, it made repayment more difficult since the funds had to be recouped from the cooperatives' accounts, rather than transferred directly from the maize proceeds after sale. In addition, some cooperatives received maize seed that did not germinate fully, contributing to significantly lower yields for large portions of their expected crops. s9(2)(ba)

The cooperatives' ability to repay the loans influenced their selection as partners for the coming 2016 Season A. After forward contracts were signed for 2016 Season A between the selected eight partner cooperatives and AIF, the cooperatives submitted their loan requests to s9(2)(b)(ii) in order to access funds for maize production, particularly input procurement and farm operations. s9(2)(ba) s9(2)(ba)

In Ethiopia, CHAI undertook exploratory work during 2015 to identify potential financial institutions that could provide affordable credit to the cooperatives when needed. Eleven banks (nine private and two public) were interviewed, and based on these discussions, one public and one private bank have been short-listed for future collaboration in the provision of loans to eligible farmers. These are: the s9(2)(ba) and the s9(2)(ba) , respectively. The two banks are proposed based on their capacity, flexibility, availability of branches in the selected project areas, and experience with similar initiatives. For example, s9(2)(ba) s9(2)(b)(ii) s9(2)(b)(i)

The financing discussions will be finalized in 2016 after the joint venture agreement has been signed and the new company is ready to enter into forward contracts for the 2016-17 season. Financial management training was among the topics covered with primary cooperative executive committee members, in order to lay the groundwork for loan management.

Access to Agricultural Inputs

Following a model CHAI pioneered in 2014, in Rwanda, leaders from MINAGRI/RAB organized an input procurement meeting with agro-dealers and project stakeholders in August 2015 to plan for the 2016 Season A. Access to high-quality inputs is critical to produce a high-quality harvest. With this in mind, the Government of Rwanda has s9(2)(ba) promoted the use of hybrid seeds as they are highly productive and resistant to diseases compared to the open pollinated varieties (OPVs). To promote uptake of these seeds, the government offers price subsidies, with farmers paying 15-25% of the market price for hybrid seeds, versus 59% of the market price for OPVs. Agro-dealers and cooperatives involved in input dealing have access to an additional discount of 8-15% on seed and fertilizers, an added benefit for CHAI's partner cooperatives as they act as dealers within the project. Cooperatives accessed seed and fertilizers at low agro-dealer rates from s9(2)(b)(ii)

Figure 2: Maize plot in s9(2)(b)(ii) cooperative

The beginning months of 2016 Season A did not follow the usual agricultural calendar in Rwanda, with late and insufficient rainfall delaying planting. Initial seed germination rates were very low, which was corrected by replacing the s9(2)(ba) seeds. Fertilizer use was constrained as farmers struggled to adjust to the unpredictable rains. The CHAI team also observed challenges with appropriate spacing and plant density rates, which will need to be addressed through extension support in 2016. Later in the year the rainfall did improve, with continuous steady rains. In some areas, farmers are optimistic about their coming harvest (see figure 2); although it is still unclear what impact the adverse weather conditions will have on yields.

CHAI facilitated mechanized land preparation for one cooperative in Rwanda, s9(2)(ba), which is the best-suited of the current partner cooperatives to mechanization because its land is flat and the plots are consolidated across farmers. CHAI provided support to s9(2)(ba) to access a loan and hire a local private mechanization provider, and the tractors were deployed for primary and secondary tillage. The benefits of mechanization include faster completion of work and more thorough breaking of soil, allowing for better moisture retention and therefore drought resistance. CHAI will continue to explore opportunities to expand this model to other cooperatives that have appropriate land conditions.

Reducing Harvest and Post-Harvest Losses

Numerous reports suggest that a significant proportion of crops is lost during post-harvesting processes, specifically shelling, cleaning and drying. In Rwanda, the post-harvest work is highly fragmented and laborious as farmers toil to process their crop using rudimentary tools and structures, leading to significant grain loss and contamination before the product is ready to go to the market. Gaps in post-harvest infrastructure posed a challenge during the 2015 Season A, with limited throughput capacity at the cooperative level constraining the total amount of grain that could be prepared for delivery to the joint venture. CHAI and partners are addressing this gap in two ways for the 2016 season: first, by developing cooperative-specific infrastructure plans to expand capacity; and second, by utilizing the joint venture's logistical capacity to rapidly move grain from the cooperatives' storehouses to the factory site.

During 2015, CHAI undertook an audit of current post-harvest processes in seven cooperatives. The goals of the assessment were to: understand the process flow of post-harvest activities, determine the bottlenecks in the processes and highlight any vulnerable processes that expose the crop to degradation or contamination, and get feedback from cooperative leaders on the types of post-harvest infrastructure that are needed to make these processes faster, efficient and more secure. Top priorities for post-

harvest infrastructure identified through this assessment include cleaning/winnowing machines, dry sheds, shelling machines, electronic dryers, and small vehicles to transport crops. CHAI completed an initial costing of the proposed infrastructure improvements, and is working with the Post-Harvest Task Force within MINAGRI and other partners to develop cooperative-level infrastructure plans that will address these gaps in the upcoming seasons. CHAI is pursuing several options to fill the identified gaps, including donations of post-harvest machinery from other development partners, short-term equipment rentals, and long-term loans. For the coming season, has donated seven shelling machines to the partner cooperatives through their corporate social responsibility program. s9(2)(b)(ii)

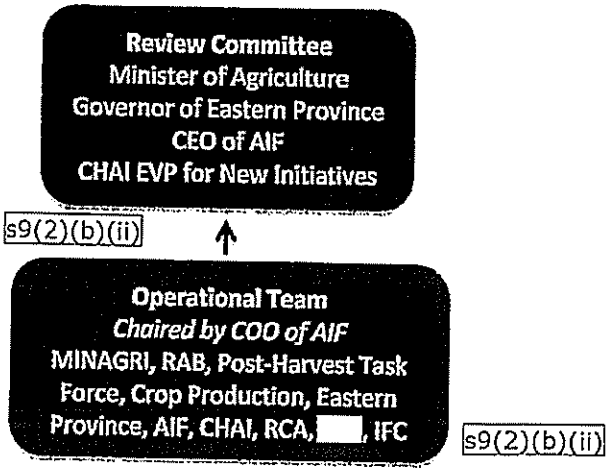
Along with these infrastructure plans, AIF is also making plans to improve transport logistics for the coming season. AIF has hired a dedicated relationship manager to work with the cooperatives on delivery schedules, and has reserved a fleet of trucks for the purpose of managing deliveries during the busy harvest time. CHAI, AIF and other key project stakeholders are in the process of updating the operational protocols for managing deliveries during the upcoming harvest in order to move grain from the cooperatives' storage facilities to the factory site as efficiently as possible.

In Ethiopia, farmers face similar post-harvest infrastructure challenges. CHAI will undertake cooperative-level assessments during 2016 using the same approach as Rwanda to understand cooperatives' priorities and develop targeted plans for improvements.

Review meetings

Building on the procurement planning meetings held in 2014, a multi-partner project team convened to develop work plans and monitor progress in the agriculture work stream in Rwanda throughout 2015. This Value Chain Optimization team includes both operational leads and a senior review committee, and has representation from AIF, CHAI, the Eastern Province, MINAGRI (including RAB, Crop Production, and the Post-Harvest Task Force), RCA (Rwanda Cooperative Agency), , and IFC (see Figure 3). With the formation of AIF and hiring of key staff, AIF was able to lead and drive this process leading into 2016 Season A, which is instrumental for establishing a sustainable procurement process. Along with supporting cooperatives to produce adequate quantities of maize at the right quality levels, the team has the goals of designing contracts for mutual long-term cooperation, supporting the selected cooperatives to become measurably best in class, and creating a continuous improvement mentality in the entire value chain. This team is involved in each step of the agricultural process, from selecting partner cooperatives to designing delivery plans for the harvest. The team is currently planning for a first season of soybean production during 2016 Season B.

Figure 3: Structure of Value Chain Optimization team in Rwanda



In Ethiopia, CHAI continues to engage with partners at the national and regional levels, including participating in national fora on maize and soya production. CHAI has joined the s9(2)(ba) s9(2)(ba) (s9(2)(ba) initiative, which has been set up to build sustainable, long-term partnerships to enable smallholder farmers to benefit from soybean production technologies such as inoculants and fertilizers. The network members include relevant government organizations, NGOs, research centers, private sector partners, the Agricultural Transformation Agency (ATA), and government seed enterprises. CHAI participated in a review meeting and field visits where the s9(2)(ba) team shared relevant experiences with other stakeholders. Furthermore, CHAI is engaging in maize value chain alliances which have been established at the regional level led by the ATA and the Oromia Agricultural Bureau. The purpose of these alliances is supporting smallholder farmers to meet maize market quality and quantity requirements.

Challenges and Lessons Learned

As discussed above, a number of challenges were identified during the 2015 Season A in Rwanda, which CHAI and partners are working to address in the upcoming 2016 season. Progress against these challenges will be reviewed following the 2016 harvest and additional adaptations made as needed for following seasons. The beginning of the 2016 Season A has already faced weather challenges, with an unclear impact on the season's productivity. Along with strengthening extension support, CHAI and partners may look at irrigation options for future seasons to mitigate farmers' dependency on the rains.

The key challenge in Ethiopia was the delay in the finalization of the joint venture agreement, which has in turn delayed contracting for maize and soybean production with the potential partner cooperatives. CHAI focused, during 2015, on cooperative strengthening activities, which will help to lay the groundwork for a more intensive collaboration in the coming year. Along with the trainings described above, CHAI is looking at ways to improve the marketing relationship between primary cooperatives and unions. Currently lack of transparency around pricing in the system leads to tensions between the parties, and could serve as a disincentive to invest in product quality improvements. CHAI will be working to improve these relationships by increasing transparency around pricing, for instance by formulating clear pricing mechanisms between farmers, cooperatives and unions, and providing weekly pricing information to primary cooperatives. CHAI is also looking at strategies to increase women's participation in unions and primary cooperatives in Ethiopia.

Output 3: Supply chain for getting complementary food product from factory to homes is efficient and effective

Indicator	Target in 2015	Achieved by December 2015	Target by 2016
Indicator 3.1 Percent of designated distribution points distributing FBF (nationally in Rwanda; within target areas in Ethiopia)			
	N/A	N/A	Designated distribution points identified
Indicator 3.2 Percent of distribution sites with stock-outs in the last 3 months			
	N/A	N/A	Standard operating procedures for stock management defined
Indicator 3.3 Volume of product loss in supply chain			
	N/A	N/A	Staff training modules developed
Indicator 3.4 % of product diverted			
	N/A	N/A	TBD

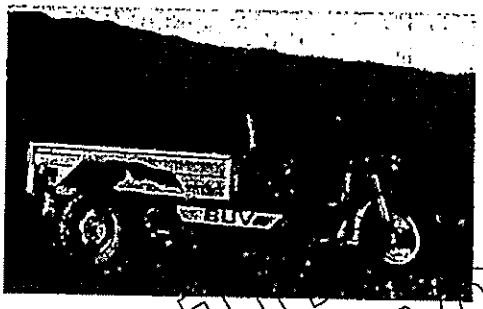
Progress towards output

CHAI worked during 2015 to develop product distribution plans in both Rwanda and Ethiopia. CHAI hired on a dedicated Senior Logistics Advisor to support distribution planning across program countries, with an initial base in Rwanda. This position will be paired with in-country distribution leads who will work on an ongoing basis to provide support and oversight to the selected distribution partners in each country.

In Rwanda, the health sector supply chain offers the most effective and efficient way to ensure that the fortified blended food (FBF) reaches households across the country. Given the bulkiness of the product, the planned FBF volumes will roughly double the total product volumes managed through the Ministry of Health's supply chain division, the Medical Production and Procurement Department (MPPD). As a result, expanding and strengthening the system to meet the expected demand is a critical step prior to product launch. CHAI undertook a multi-step process of literature reviews, transport and logistics surveys, field interviews and finally market inventories (to determine actual market costs and storage plan recommendations) to develop the design and costing for a national FBF distribution plan, utilizing existing structures to the extent possible. The distribution plan needs to ensure that FBF reaches eligible households across the country with a reliable supply chain that minimizes the risk of stock-outs and wastage, guarantees the quality of the delivered product, and allows for careful product tracking to minimize the risk of diversion. Costs should be kept as low as possible given these parameters.

A critical input to the supply chain design is the location of existing health centers and new health posts offering primary health care services across Rwanda. Armed with handheld GPS units, CHAI is in the process of manually plotting waypoints for the existing Health Centers and Health Posts throughout the entire nation. As of December 2015, CHAI has finished mapping 26 out of the 30 districts in the country, with 364 Health Posts and 72 Health Centers mapped. This mapping has already been helpful in understanding the distance between Health Posts and Centers and beneficiary households. In the regions mapped to date, 96% of households fall within a one-hour walk of the nearest Health Center or Health Post, the standard set by the Ministry of Health as the target maximum distance from health services. If these findings are consistent across the country, last-mile product delivery can likely be accomplished on foot, with households picking up FBF supplies from the nearest Health Center or Post.

Figure 4: Image of Basic Utility Vehicle proposed for FBF delivery in Rwanda

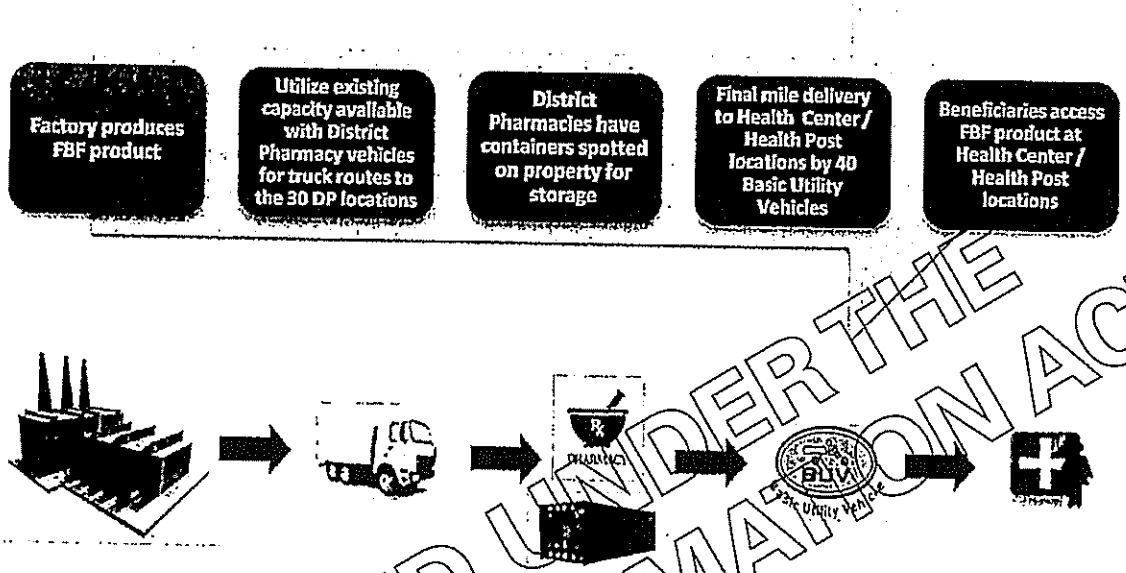


The distribution plan is broken down into three critical elements: truck routing, storage, and delivery. For truck routing, CHAI is proposing to use existing District Pharmacy vehicles to transport FBF product from the factory to the district storage locations, utilizing existing capacity within the MPPD system. The District Pharmacy vehicles will also increase efficiency by distributing the FBF directly from the factory to the Health Centers and Health Posts within the three districts in Kigali, thus eliminating storage requirements in the main urban area.

Having compared buy versus rent options for storage, one option CHAI has proposed is a modular storage container solution for the benefits of flexibility and scalability. Storage containers can be purchased at relatively low cost, are readily available in East Africa, and can be quickly placed or removed from any pre-determined location. Finally, Basic Utility Vehicles (BUVs) are under discussion as a delivery option to move FBF from district storage locations to Health Centers and Health Posts. Currently, health commodities are delivered through the usage of hired cars, bicycles, or motorbikes, with little spare capacity for additional supplies. The BUV is a large, stable, three-wheel all-terrain vehicle with a large cargo capacity. Its cargo capacity, ruggedness, ease of use, and fuel efficiency make it a highly cost efficient option. The BUV is currently in use in similar roles in East Africa, and could provide additional benefits to Health Centers and Health Posts as an ambulance platform.

A schematic of the proposed supply chain for FBF is shown in Figure 5. The solutions for truck routing, storage and delivery are designed to be flexible enough to allow for a large overall increase in demand as the program scales up. The recommended solution can be scaled to double its current planned volumes without large additional capital investment. Analysis of system capacity control limits found that, by increasing route frequency and adding minimal storage locations, capacity can be doubled. This doubling in capacity can be done at a reduced overall cost per unit and cost per kilometer. In other words, the more FBF product is introduced into the supply chain, the more cost effective and efficient the system becomes.

Figure 5: Proposed distribution system for FBF in Rwanda



In Ethiopia, CHAI built on the distribution assessments conducted in 2014, with a new detailed product-mapping pathway for both public health and commercial channels extending to last-mile delivery options. The main objective of these exercises was to assess selected distribution channels in-depth and provide recommendations for distribution approaches of FBF for children aged 6-23 months. The study also included a case study to follow the distribution pathways of s9(2)(ba) , which most resemble the anticipated FBF product. This analysis clarified the point-to-point product distribution mapping including the transportation mechanism from the central warehouse through to its receipt by the end-users in both the public health and commercial channels. The assessment also generated information on commercial product mapping, product pricing and end-user demographic information. As such, these assessments are serving as a learning platform for the distribution pathways, mechanism and penetration of these products providing key inputs for designing FBF distribution strategies. CHAI has also put into place a mechanism to continuously track changes in the distribution chain and update the report on a regular basis.

Challenges and lessons learned

In approaching the supply chain costing in Rwanda, the lack of reliable country-specific financial data on the trucking industry proved a challenge, with limited benchmarks against which to compare project costs. CHAI put together estimated market costs through detailed literature reviews, transport and logistics surveys, field research and interviews, and market inventories, estimating a "mean" cost per kilometer for benchmarking purposes. Aggregate US trucking data were utilized to provide guidance where none existed locally, and confidence intervals were calculated to provide a determined level of certainty for our costing predictions. These data were utilized to produce key findings in terms of costs, constraints, and recommendations that supported the distribution proposals.

Output 4: Demand, uptake and consumption of complementary food product by the poor is optimal

Indicator	Target in 2015	Achieved by December 2015	Target by 2016
Indicator 4.1 Percent of caretakers reporting accurate understanding of serving size, number of portions per day, storage, preparation etc.			
	N/A	N/A	Action plan for education campaign developed
Indicator 4.2 Percent of health workers providing good information to families on how to use the product			
	N/A	N/A	Training materials for health workers prepared
Indicator 4.3 Percent of eligible households accessing FBF in the last month (includes poorest and those purchasing the subsidized food in rural areas)			
	N/A	N/A	Implementation plan for subsidy scheme developed
Indicator 4.4 Percent of households reporting receiving product at the correct price			
	N/A	N/A	N/A

Progress towards output

Market Research

In both Rwanda and Ethiopia, CHAI continued market research during 2015 to understand household preferences for complementary foods and begin to formulate packaging, branding, and messaging plans. This work is critical to ensure that the FBF is known, liked and used appropriately in target households, regardless of the price at which the FBF is offered.

Market studies in 2015 focused on:

- Current decision-making factors, i.e. who is making food choices for 6-23 month olds, what are the factors influencing their decisions, and who influences the decision maker (e.g. key people, media, or health system actors)
- Decision makers' objectives, perceptions, aspirations and preferences regarding complementary foods, and previous experiences with baby foods or nutrition campaigns
- Knowledge, attitudes, and beliefs of mothers towards fortified or processed complementary foods. This includes low-cost baby food (affordability, willingness to pay, decision factors, differentiation with other brands) and free baby food (willingness to use daily)
- Where do mothers currently receive information regarding the health and nutrition of their child (what are their trusted networks)
- Mothers' perceptions surrounding breastfeeding and where they receive their information

- Water and sanitation habits, such as storage of water in the house, access to water, use of flasks/containers, and sanitation information and practices [in Rwanda]

In Rwanda, CHAI has interviewed a total of 116 mothers of 6-23 month olds across 11 districts, all from the lower-income groups that will be targeted for free and subsidized FBF. In Ethiopia, the assessment covered a total of 104 participants, including 72 mothers (pregnant women, mothers of infants less than six months of age, and mothers of 6-23 month olds), 18 husbands, six grandmothers and eight health extension workers. After the results are compiled, CHAI will use the market research to build out prototype messaging and packaging options, which will then be tested and refined through additional rounds of fieldwork.

CHAI has continued collaborating with AIF's marketing team to ensure alignment of product positioning and branding between the rural and commercial markets s9(2)(b)(ii) s9(2)(b)(ii) s9(2)(b)(ii) The results will be used to inform the design of AIF's commercial brand.

Partnership Cultivation

In both Rwanda and Ethiopia, CHAI has engaged in a range of partnership fora to build the relationships that will be needed to ensure a coordinated roll-out of FBF information and promotional activities at the time of product launch. In Rwanda, CHAI participates in regular meetings of the Nutrition Technical Working Group, the key coordinating body for nutrition programs. In Ethiopia, CHAI has continued to participate and contribute to monthly Nutrition Development Partners' Forum meetings where support to the Government of Ethiopia is coordinated. CHAI also continues to participate in the Productive Safety Net Program (PSNP) Social Development Task Force. Such engagements will subsequently pave the way for smooth implementation of the public health programs.

In Ethiopia, CHAI's engagement with the PSNP is particularly important to design an effective roll-out strategy to target PSNP beneficiaries. During 2015, CHAI supported the Social Development Task Force and Nutrition Task Force in the drafting and finalization of Terms of Reference to revitalize the Nutrition Task Force. The nutrition team continues to closely monitor the PSNP IV rollout, understanding the eligibility system changes and the evolving PSNP food basket. CHAI undertook a rapid assessment of the PSNP structure at the district and village levels with the aim of understanding the distribution mechanism, targeting and recording of beneficiaries. CHAI continues to engage influential PSNP partners such as the Household Asset Building Program in the Disaster Relief Management and Food Security Sector to provide them with updates on the program.

CHAI also provided direct technical and financial support to the Ethiopian Ministry of Health in organizing a Breastfeeding Week held in August 2015. The event promoted exclusive breastfeeding up to the age of six months and continued breastfeeding with appropriate complementary feeding through the age of two years, reaching more than 60% of the population or at least 60 million people.

There are no challenges / lessons learned to report on this work stream at this stage.

Output 5: Evidence is generated on the effectiveness of the complementary food product to inform replication of the approach in other contexts

Indicator	Target in 2015	Achieved by December 2015	Target by 2016
Indicator 5.1 Number of monitoring reports produced tracking risk matrix and documenting any course correction			
	2	Two monitoring reports submitted, with Q3 report and Annual Report.	4
Indicator 5.2 Number of rigorous impact, cost effectiveness and process evaluations completed and % of recommendations implemented			
	Independent evaluation design options developed	An independent evaluation consultant built out design options for the Ethiopia study, which were reviewed by DFID and other partners in December 2015	Independent evaluation commissioned
Indicator 5.3 Number of studies published in peer-review open access journals			
	0	N/A	1

Progress towards output

Monitoring and Evaluation (M&E) is a key component of the CHAI Nutrition Initiative. CHAI actively monitored and managed program risks during 2015, providing two full updates to the project "risk matrix" and holding regular management meetings to mitigate risks as needed. In Rwanda, CHAI continued baseline data collection within a cohort study approach, completing four rounds of quarterly data collection. Additionally, CHAI received ethical approvals for a small number of protocol changes which will improve the data obtained through the study. In Ethiopia, CHAI worked with an external evaluation advisor to develop several potential study design options, which have been reviewed with partners and prioritized for further discussion with Government partners in 2016.

Cohort Study in Rwanda

CHAI's activities in Rwanda during 2015 focused on implementation of the pre-FBF introduction (historical) cohort study, with four rounds of quarterly data collection completed. The primary objective of the study is to provide baseline data on a range of potential factors influencing the nutritional status of children 6-24 months of age, including stunting. This first phase of the study will end in May 2016. By then, eight rounds of data collection (collected on a quarterly basis) will be completed for approximately 600 children enrolled in the pre-FBF historical cohort.

CHAI is implementing the nutrition program under the leadership of the Ministry of Health (MoH). Meetings are held on a regular basis at the MoH to discuss progress and provide updates on the study. In addition, a research advisory team composed of members from different national bodies (the

Ministry of Agriculture, the Ministry of Local Government, and the School of Public Health) is tasked with overseeing the study and providing advisory support to the implementation team. Once every quarter, CHAI presents progress on the study along with preliminary results during the team quarterly meeting. CHAI also communicates on progress with local authorities at the district level to provide direct feedback to local partners.

CHAI has a dedicated study implementation team in Rwanda, comprised of eight data collectors, one field coordinator and one M&E Associate. A Data Quality Officer joined the team in 2015 to support and implement all data quality activities and ensure that the data collected are accurate, complete and reliable. The Data Quality Officer is responsible for implementing Data Quality Assurance and continuously strengthening data quality systems.

Study Protocol Amendments

In July 2015, CHAI submitted an amendment to add data collection on the height and weight of the mother to the existing protocol to the Rwanda National Ethics Committee, which was subsequently approved. This was an important addition to the existing household survey as there is a strong evidence base surrounding the effect of mother's stature as a determinant of fetal growth and birth weight of the child.

After a review of the protocol and household survey by a panel of nutrition evaluation experts convened with the support of DFID, additional changes were proposed. In January 2016, CHAI will assess the cost of adding blood sample collection to the protocol to measure micronutrient levels in the children enrolled in the study (specifically Hemoglobin and Vitamin A). If the costs are manageable, CHAI will submit an amendment to the Institutional Review Board in Rwanda for approvals in 2016.

Impact Evaluation Study Design

CHAI recruited an independent consultant to review potential design options for a rigorous impact evaluation in Ethiopia. The consultant visited Ethiopia to meet with key Government of Ethiopia offices such as the Ethiopian Public Health Institute (EPHI), and reviewed relevant documents on the program. The advisor helped to identify potential evaluation design options and develop a briefing document describing potential risks and benefits of various approaches. In collaboration with DFID, CHAI reviewed these design options with a team of expert advisors in December 2015. Along with DFID and CHAI, the World Food Program and s9(2)(ba) were represented at the meeting. Following discussion, it was agreed that a step-wedge design with randomized assignment to earlier or later phases of the project would be the ideal approach, with non-random assignment possible if groups were comparable across other indicators. This proposal will be discussed further with the appropriate Government partners in 2016, once the joint venture agreement has been signed.

In order to effectively utilize and strengthen national health information systems, CHAI undertook an assessment of the nutrition component of the national Health Management Information System (HMIS) in Ethiopia during 2015. Data analysis and report writing will be completed in early 2016. CHAI will use the results of the assessment to identify gaps in data quality and/or availability of key nutrition indicators, and work with the HMIS technical working group to pursue improvements.

Challenges and lessons learned

The lack of clarity on distribution channels that will be used for the FBF products in Ethiopia has posed challenges for the process of designing an evaluation methodology. CHAI has aimed to parallel process the development of feasible design options with the joint venture negotiations, so that design planning can move forward quickly once the joint venture agreement is finalized. It may also be possible to influence the FBF distribution plans with an understanding of the design requirements to generate strong evidence of program impact.

D. Value for Money

One of CHAI's core values is frugality. Great care is taken to ensure that funds spent on the purchase of commodities or in the implementation of program activities are utilized in a manner that guarantees that minimum economy (cost) is combined with maximum efficiency and effectiveness. This principle is mainstreamed into all levels of CHAI's operations to make sure that CHAI meets it program objectives while remaining fiscally responsible with all donor funds.

CHAI strives to keep its operating expenses minimal by putting in place strict policies toward this end. These include:

- Maintaining a lean management team with small back-office teams, both in-country and at the headquarters level, keeping salaries and policies in line with budget constraints. CHAI salary structures are in line with civil society and the public sector.
- Instituting policies that emphasize low-cost alternatives to typical operating expenses, for example: procuring items using a tender process that identifies the most competitive prices and after sale service available, using economy class airfare for all staff, asking staff to make travel arrangements in advance to take advantage of low prices and fares, negotiating favorable hotel rates, and using skype for long distance calls. CHAI's target rates for travel and other non-salary expenditure meet or fall well below recommended maximum rates suggested by normative bodies such as the World Bank.
- Using internal resources as much as possible to minimize duplication of efforts and the associated costs. This can take the form of utilizing internal research material to inform new program work, and positioning staff to provide support across diverse program functions where possible.

CHAI maintains a very low indirect cost rate compared to our peers. Indirect costs are costs incurred for many common and joint objectives across our organization and cannot be readily identified or tracked to a single activity or project. Supporting functions included within this group of activities include the functions of Accounting, Administration, Budgeting, Donor Reporting, Human Resources, IT Support, Internal Audit, Global Payroll, and Global Management. The vast majority of indirect costs are driven by our flat organizational model and related to personnel at headquarters in these support functions. Most importantly, these support functions allow CHAI to maintain an adequate infrastructure to efficiently manage multiple projects across various continents. This infrastructure ensures CHAI can meet its programmatic objectives while remaining fiscally responsible with all donor funds.

Within the nutrition program in Rwanda and Ethiopia, CHAI's approach to assuring value for money has remained consistent with its guiding principles. CHAI has a small team coordinating the nutrition program across countries, with half of the team based in the region to reduce travel costs. Our in-country teams are leanly staffed, with the teams growing only as needed to address program demands. National and international travel is consolidated as much as possible, with trips being leveraged to serve multiple purposes. CHAI has also made cost-saving decisions with regard to specific programmatic objectives, such as conducting the Rwanda cohort study in-house rather than outsourcing to a firm that would undertake the same work at greater cost.

Besides focusing on economic value, CHAI has also placed focus on overall program effectiveness as a way of enhancing the overall project's value for money. With this in mind, CHAI is using a phased approach of implementing the agricultural and nutrition work, starting with implementation in Rwanda and Ethiopia, before expanding to the other target countries. This ensures all possible lessons learned from and knowledge gained during start-up and operation can be transferred to the remaining countries as the program is introduced in each successive location and phase. CHAI carefully monitors the quality of program delivery, for instance by bringing on a dedicated quality officer to ensure the data collected through the Rwanda cohort study are robust. CHAI is working closely with government partners in order to support the sustainability of the project, an important investment for long-term effectiveness.

The efficiency of FBF production is a key priority for both CHAI and AIF. Measures to bring down the cost of production will help to ensure the competitiveness of SuperCereal s9(2)(b)(ii) s9(2)(b)(ii) Lower cost production will also allow governments to purchase additional product volumes and/or lower the price to consumers, thereby increasing product access. In order to reduce product cost, AIF is setting up the production facilities and management teams as efficiently as possible while still meeting rigorous quality standards. Components of CHAI's agricultural support are designed to reduce the cost of inputs, such as lowering farmers' lending rates and maximizing marketable yields. s9(2)(b)(ii)

Finally, the project represents strong value for money given that donor funds are being leveraged to mobilize additional private and public resources. AIF plans to build three million factories in Rwanda and Ethiopia for a total investment of approximately million. This means that for every dollar of donor funds spent to date to support CHAI's work on the project, approximately $20 of investment funds have been committed to establish sustainable local production facilities. Additionally, credit from IFC is being leveraged to support the revolving loan fund for farmers, with a credit line of million secured in Rwanda. s9(2)(b)(ii) s9(2)(b)(ii) s9(2)(b)(ii) s9(2)(ba)

E. Risk Management

The project has become somewhat lower risk over the past year, with the formation of the AIF holding company and the launch of the joint venture in Rwanda. There continue to be a range of internal and external factors that could impact the success of the project. These are discussed in detail in the program's risk matrix. CHAI and partners work to mitigate these risks through regular reviews and proactive communication where risks threaten to impact program outcomes. Internally, CHAI's project management team holds biweekly calls to review progress, identify key risks, and decide on next steps for any critical issues. This team reviews and updates the full project work plan approximately once per quarter. Externally, risks are managed through the relevant committee structures for each component of the project: progress on the joint venture is reviewed at AIF board meetings; agricultural support and crop procurement are reviewed via the dedicated operational project team, with oversight from a senior review team; and the Rwanda cohort study is managed under a research advisory team. Each of these groups meet approximately once per quarter to review progress, discuss risks, and formulate plans for the coming period.

The timing of factory construction is a key risk in both Rwanda and Ethiopia, with the potential to delay product launch and therefore programmatic impact. CHAI receives weekly updates from the AIF operational team in order to track progress and provide support where needed. CHAI also participates actively in AIF Board meetings as an official Board observer. CHAI will continue to use these updates to manage timelines for product distribution and educational activities in order to ensure a coordinated launch plan. CHAI and partners continue to monitor the business model figures closely, s9(2)(b)(ii)

The 2014-15 maize season in Rwanda offered an opportunity to better understand the risks involved in the agricultural component of the program, and put better mitigation measures in place going into the 2015-16 season. For instance, when the market price of high-quality maize went above the fixed price offered in the forward contracts, farmers faced a decision between fulfilling their contracts and earning more for their crop sales. During the 2015 harvest, CHAI and partners released the cooperatives from their obligations in the forward contracts to allow them to sell at a higher price. Going into the 2016 harvest, the forward contracts have been set up to allow for a floating market price, with a cap and a floor to protect both AIF and the cooperatives.

One additional issue that was flagged in the review of the 2014-15 season is the risk that yields do not improve as anticipated through the package of interventions to support farmers. Maize yields appeared to remain constant between baseline surveys in 2014 and post-harvest surveys in 2015. While this may in part represent an inherent reporting bias – farmers were surveyed for information about their yields at the same time as contract negotiations were ongoing for the coming season, which may have

influenced their responses – it is also possible that the package of support has not yet had the intended impact on yields, due to climatic conditions, pests, or other challenges that influence crop development. CHAI will be working with technical experts from DAI Inc. as well as national government agencies to interrogate and improve the services offered to farmers, including input packages, agronomy advice, and harvest practices. This risk has been incorporated into the risk matrix and will be reviewed on a regular basis.

While it is too early to report on the status of risks to FBF distribution and uptake, CHAI has been working to build robust product launch plans, taking into account the potential risks identified in the risk matrix. For the distribution work stream, having a well-managed logistics information system will be key to ensuring the system can respond to changes in demand at the site level, thereby avoiding both stock-outs and wastage due to excess stock. For the product education and uptake work stream, CHAI has been conducting market research to understand the preferences of beneficiary households, and will continue this work with product prototypes in 2016. The Ministry of Health in Rwanda is driving plans to put in place appropriate controls s9(2)(ba)

In terms of program evaluation, there remains a risk that an experimental design will not be possible for the study in Ethiopia. In collaboration with DFID and technical advisors, CHAI has developed a short-list of potential evaluation design options, to be further discussed with government partners in 2016. The development of a robust design does rely heavily on random assignment to earlier or later phases of product roll-out. If this is not feasible, CHAI may pursue an experimental design in one of the potential Phase 2 countries.

There is also a risk that the impact evaluation(s) will not demonstrate the anticipated impact on stunting rates. This risk can be mitigated through a few methods. First, CHAI is updating reviews of maternal nutrition and water, sanitation and hygiene (WASH) interventions in both Rwanda and Ethiopia, and looking at the latest available evidence on the interrelationships between these factors and stunting. Based on the results of these reviews, CHAI may incorporate additional interventions into either the full program or into a subset of sites for the purpose of a targeted evaluation. Second, CHAI is considering adding micronutrient status as an outcome measure in the Rwanda study, along with anthropometric indicators. Micronutrient status may be more directly impacted by FBF consumption, and represents program impact effectively since improved micronutrient status is associated with healthy development, particularly for the immune system. Finally, CHAI will review the sampling approach for the Rwanda study, as well as the Ethiopia study as the design is structured, to ensure that the sampling framework is well aligned with distribution plans and will allow for robust conclusions (for instance, making sure high- and low-uptake groups will be represented in the sample in Rwanda). This risk and the proposed mitigation plans have also been incorporated into the program's risk matrix.

F. Monitoring & Evaluation

New Research and Implications for the Project

A special issue of *Maternal and Child Nutrition* was published in December 2015 providing a review of new evidence on specialized nutritious foods to improve complementary feeding. While SuperCereal Plus was not included among the studies in the special issue, several articles have findings that are relevant to program design. For instance, studies of lipid nutrient supplement (LNS) consumption found that observed consumption was significantly lower than reported consumption, and that a relatively small proportion of the target daily amounts were consumed by the intended recipient.[2] Separately, a willingness-to-pay study examining an LNS product in Ethiopia found that 96% of respondents indicated a positive response when asked about their willingness to pay, but when the same respondents were asked to purchase the product in the market, only 25% actually purchased the product.[3] While the findings regarding LNS are not entirely applicable to this project – the FBF is designed to fit existing consumption habits, rather than being additional to the diet like LNS – the studies' methods and findings are useful for program design. For instance, household observations will be a useful addition to surveys to understand actual product consumption by the target market, and pricing strategies will have to take into account more factors than willingness-to-pay studies to determine an affordable price point.

A randomized controlled trial evaluating the impact of SuperCereal Plus on nutritional outcomes in Bangladesh was published in 2015.[4] In this cluster randomized trial, children were followed from six months to 18 months of age, with assignment to one of five study groups: four intervention groups were assigned to receive either LNS, a local chickpea-based product, a local rice-lentil product, or WFP's wheat-based Super Cereal Plus; and a control group received nutrition education with no food supplement. Adherence to the supplementation was high within each of the groups. Results indicated that stunting dropped by 5-6% in the groups assigned to LNS and the local chickpea-based product, with non-significant reductions in stunting for the SuperCereal Plus and locally developed rice-lentil product. However, there was a modest increase in linear growth across all four intervention groups, with significant improvements in length within the group receiving SuperCereal Plus.

There are a number of reasons the CHAI project should have a greater impact on stunting than the results of the Bangladesh study suggest: in the Bangladesh study, the SuperCereal Plus was offered as a "snack" between meals with 32 grams and 64 grams given to 6-11 and 12-18 month olds respectively, whereas in Rwanda and Ethiopia, the recommended serving size of FBF is 50 grams from 6-11 months and 150 grams from 12-23 months, designed to fully meet children's RNI with continued breastfeeding. Additionally, the stunting rate among the six-month olds was 20% at baseline, indicating that the

[2] Abbeddou et al., *Comparison of methods to assess adherence to small-quantity lipid-based nutrient supplements (SQ-LNS) and dispersible tablets among young Burkinabé children participating in a community-based intervention trial,* and Ickes et al., *Impact of lipid-based nutrient supplementation (LNS) on children's diet adequacy in Western Uganda.* Maternal and Child Nutrition: Supplement: Policy, Program, and Innovation in Complementary Feeding. Volume 11, Issue Supplement S4, December 2015. As summarized in Saskia de Pee's editorial introducing the supplement, *Special Nutritious Solutions to Enhance Complementary Feeding.*

[3] Segrè et al., *Willingness to pay for lipid-based nutrient supplements for young children in four urban sites of Ethiopia.* Maternal and Child Nutrition: Supplement: Policy, Program, and Innovation in Complementary Feeding. Volume 11, Issue Supplement S4, December 2015.

[4] Christian et al., *Effect of fortified complementary food supplementation on child growth in rural Bangladesh: a cluster-randomized trial.* International Journal of Epidemiology: August 2015.

children already had an accumulated growth deficit which can be difficult to fix with a small intervention on complementary feeding. Rates of exclusive breastfeeding for children under the age of 6 months were very low (20-30%) compared to 85% in Rwanda, again indicating that children would have needed substantial catch-up growth in the 6-18 month window to counter the effects of early undernutrition, and potentially exposing the children to infections that would have increased nutrient requirements.

A second study by Marron et al. in Sierra Leone compared the effectiveness of four supplementary foods (SuperCereal, Fortified Vegetable Oil, Sugar, and SuperCereal Plus) in the treatment of moderate acute malnutrition via a prospective cluster randomized controlled trial.[5] Children 6-59 months of age were enrolled into the study in a normal programmatic setting. The study was terminated early due to the Ebola outbreak and sample size was reduced from 5,000 at enrolment to 1,159 who completed the study. Results found no significant difference in moderate acute malnutrition (MAM) recovery rates among the four supplementary foods. This study has limited implications for the program as it is a limited sample size and the power to detect a significant difference was reduced.

While the results of these studies are not directly applicable to the project, the Bangladesh study in particular does raise the question of how to handle unexpected results for stunting indicators. This possibility has been incorporated into the program's risk matrix, as discussed in the previous section. CHAI will be looking at ways both to ensure the program achieves the desired impact on nutritional outcomes, and ensure that program evaluations are designed to effectively measure that impact.

CHAI participated in a technical consultation on multiple micronutrient (MMN) supplements in pregnancy hosted by the World Health Organization (WHO) in Geneva in August 2015. A growing body of evidence indicates that multiple micronutrient supplements have beneficial effects over and above the current standard of care of iron folate supplements during pregnancy. The Lancet 2013 nutrition series cites an 11-13% reduction in low birth weight and small for gestational age (SGA) births with the use of multiple micronutrients as compared to iron folate.[6] A recently published Cochrane review by Haider and Bhutta finds a similar effect, with a significant 10% reduction in the risk of SGA births and a 12% reduction in the risk of low birth weight among women receiving MMN supplements as compared to iron supplements, with or without folic acid.[7] No differences were observed between the groups' overall rates of preterm births, perinatal mortality, or neonatal mortality, although stillbirth rates decreased by 9% in the group receiving MMN supplements.[8] s9(2)(ba)
s9(2)(ba)
s9(2)(ba) CHAI is in the process of reviewing the project's approach to maternal nutrition coming out of this meeting.

[5] Marron et al., *Comparison of four different complementary foods in the treatment of Moderate Acute Malnutrition (MAM) in children under five in Sierra Leone.* The FASEB Journal: Vol. 29 No. 1 Supplement 898.2. April 2015.
[6] Bhutta et al., *Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost?* Lancet series: Published online at http://dx.doi.org/10.1016/S0140-6736(13)60996-4. June 6, 2013.
[7] Halder BA and Bhutta ZA, *Multiple micronutrient supplementation for women during pregnancy (Review).* Cochrane Collaboration: The Cochrane Library, Issue 11 2015.
[8] Ibid.

Nutrition continued to be a top priority for the Government of Ethiopia in 2015, with drought creating a nationwide food and nutrition emergency in the second half of the year. Culturally acceptable and affordable fortified blended foods may play an important role in mitigating the situation in the coming months and years, and the Government of Ethiopia is prioritizing support for local producers to meet needs from domestic sources as far as possible. A high-level delegation from Ethiopia visited Brazil and Uganda to learn about nutrition programs in both countries during 2015, and a next phase of the National Nutrition Program is being developed taking into account lessons from this experience. Ethiopia also committed to the Seqota Declaration to end hunger and eliminate child stunting by 2030.

Beneficiary Feedback

While it is too early in the project to solicit feedback from direct beneficiaries of nutritional support, CHAI undertook an in-depth review of the agricultural program in Rwanda after the 2014-15 season by speaking with the leaders of partner cooperatives and beneficiary farmers. Farmers and cooperative leaders were positive about their access to finance and a guaranteed market through the project, but had concerns about s9(2)(b)(ii) and thought that the extension support could be improved. This feedback helped to inform the program changes described above, particularly discussing contract terms in more depth and agreeing on pricing prior to forward contract signatures, and strengthening the extension support model.

Information Sharing

CHAI has established systems to share information internally and externally through a regular process of meetings and calls. Coordination across the program's work streams will be particularly important as product launch nears. The Framework for Program Monitoring, Evaluation, and Reporting provides an overview of major data sources and routes of information sharing (see Annex). Looking forward to 2016, CHAI will also be setting up regular internal calls with the potential Phase 2 countries to share lessons from Rwanda and Ethiopia from the initial stages of program design.

G. Sustainability and Exit Planning

CHAI's role in the nutrition initiative is primarily as a facilitator, and exit planning is built into the program design. The joint ventures are structured as partnerships between government and private partners, with CHAI playing a supportive rather than a driving role once the ventures are launched. s9(2)(b)(ii) s9(2)(b)(ii)

The profit sharing model is designed to generate returns for partner governments, contributing to the sustainability of the subsidy structure to ensure product access for vulnerable populations.

CHAI is providing agricultural support for partner cooperatives in close collaboration with the appropriate government partners, particularly under the restructured extension support model in Rwanda. This support is designed to build capacity within existing structures, rather than creating a parallel system that would require continued external support. CHAI and partners are oriented towards developing a long-term business relationship between AIF and cooperatives, with partners playing a supportive role. CHAI has proactively passed on responsibility for project management as the appropriate partners are in place: for instance, the AIF operations team directly coordinated procurement planning in 2015, taking on a role that CHAI had played in 2014; and the loan management team at s9(2)(b)(ii) interfaced directly with cooperative management to set up loans, a role that was also played by CHAI in 2014. In Ethiopia, CHAI has been working with the regional agricultural team from the initial stages of program design, and has been engaging with the relevant partner fora to establish the project within a supportive existing framework. Positioning stakeholders to play their long-term role in the project as quickly as possible will facilitate long-term sustainability, reducing dependence on CHAI.

In the design of product distribution and education plans, CHAI is likewise working closely with government partners to ensure the project continues to be government-owned. In Rwanda, for example, CHAI is working closely with the Medical Production and Procurement Department of the Ministry of Health to design a low-cost distribution system that works within the existing public health supply chain. CHAI will be working with the Rwanda Health Communications Center during 2016 on product messaging, and will channel information about the product to the community through both government Health Extension Workers and the non-governmental partner organizations that support the national nutrition strategy. A similar approach will be taken in Ethiopia.

Annex: Framework for Program Monitoring, Evaluation, and Reporting

For the nutrition initiative to be successful, multiple interdependent work streams must be executed with close coordination. To promote coordination and review progress, CHAI will engage in both program monitoring and program evaluation activities. Program monitoring will review implementation and progress towards milestones and targets, in particular to identify gaps and generate opportunities to adjust program activities, as needed. Program evaluation, including process evaluation, will be undertaken to more rigorously assess the relationship between our interventions and the outcomes observed. CHAI is also placing a special emphasis on an impact evaluation to assess how our program interventions – particularly the uptake of nutrient-dense products – impact the reduction of chronic malnutrition amongst children from 6-23 months of age, during the complementary feeding period.

Primary Evaluation Questions

Program, process, and health impact monitoring and evaluation activities will be undertaken within and across nutrition initiative countries.

Program evaluation questions will aim to answer:

- Do the poorest and most vulnerable children[9], 6-23 months of age, in partner countries have access to a diet which promotes healthy growth and development?
- Does the business model maximize health benefits for the poorest and most vulnerable children, 6-23 months of age?
- Do the target farming cooperatives/unions have the capacity and resources to engage effectively in the production of the high-quality, nutritious-dense complementary food?
- Is the supply chain for getting the complementary food product from the factory to the homes of the poorest and most vulnerable households efficient and effective?
- Are the demand, uptake and consumption of complementary food product by the poor and most vulnerable children optimal?
- Is evidence generated on the effectiveness of the complementary food product to inform replication of the approach in other contexts?

Process evaluation questions will aim to answer:

- Who are the children accessing and receiving complementary food product? How are they accessing the product?
- How much of the product are the children consistently consuming?
- How many of the poorest and most vulnerable children are able to access and receive the product consistently?
- How is the product moving from the factory to the homes?
- How has the public health work stream been able to effectively leverage existing community health education activities related to infant and young child feeding?
- What are the challenges to local processing and product introduction at scale?

[9] Poorest and most vulnerable groups defined as the fully-subsidized portion of the market in each country.

- What challenges and opportunities have been encountered in the delivery, access, and uptake of the product by the poorest and most vulnerable children?
- How many small-holder farmers have been able to contribute inputs to the production of the complementary food product?

Health impact evaluation questions will aim to answer:

- If well implemented, what is the effect of the complementary food product on the poorest and most vulnerable children, 6-23 months of age, in terms of:
    - stunting, wasting, underweight;
    - change in length, weight;
    - rate of change in length, weight; and
    - micronutrient status (including iron, vitamin A)
- What primary determinants of child undernutrition (caregiver characteristics, knowledge, behavior; index child characteristics; household food insecurity; WASH practices; etc.) are limiting stunting reductions among children consuming the complementary food product, and by how much?

Below is a summary of the data collection sources, focus areas per data collection source, frequency of data collection, and partners involved in the design/implementation/review. Please note that the timelines below may change based on program progress reviews.

Source	Focus Area	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	Partners
Quarterly household surveys with intended beneficiaries of complementary food product	- Distribution of characteristics of beneficiary household, caregiver, and index child; - Index child health status, including stunting and wasting; - Product access, consumption, preparation, messaging	x	x			x	x	x	x	x	x	x	x	- Design and Implementation: MOH and the Technical Advisory Group - Ongoing consultation on design, implementation, and review: WFP, s9(2)(ba') DFID, s9(2)(ba)
Healthcare worker surveys with intended community- and facility-based providers	- PLW, infant and young child feeding messaging; - Product messaging; - Product distribution				x				x				x	- Design and Implementation: MOH and the Rwanda Health Communication Center - Ongoing consultation on design, implementation, and review: WFP, s9(2)(ba)
Distribution/Logistics information management system	- Distributions sites: coverage, stock-outs, product loss; - Sales; - Capacity building (staff training); - Incident reports				x	x	x	x	x	x	x	x	x	- Design and Implementation: MOH – MPPD
Farmer surveys with intended smallholder farmers contributing inputs to the fortified complementary food products (potentially with observed yield measurements)	- Capacity building; - Crop yield and sales; - Access to post-harvest infrastructure; - Access to loans and other financing mechanisms		x	x		x	x				x	x		- Design and Implementation: Ministry of Agriculture, Ministry of Local Government (Eastern Province Officials), MFAT, DAI - Review via multi-stakeholder committee

Source	Focus Area	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	Partners
Cooperative (Union) surveys	- Capacity building; - Crop yield and sales; - Access to loans and other financing mechanisms; - Alignment with gender policies; - Commercial relationship with joint venture (pricing, quality terms etc.)			x				x				x		- Design and implementation: Ministry of Agriculture, Cooperative Promotion Agency, Ministry of Local Government (Eastern Province Officials), MFAT, DAI
AIF Board Reports and Meetings	- Production volumes and product pricing; - Crop purchase volumes and acceptance rates; - Revenue generation; - Environmental impact	x	x	x	x	x	x	x	x	x	x	x	x	DSM, IFC, , , and partner governments (AIF) s9(2)(ba)
Scheduled and unscheduled monitoring visits by CHAI and/or MOH staff, led by each work stream team, to: - beneficiary communities - product distribution points (health facility or community kiosk/market) - factories - farmers/cooperatives	- Program implementation and quality assurance; - Program/distribution intermediaries' (distribution centers, healthcare workers, community health workers) and beneficiaries' knowledge, attitudes, and practices; - Quality assurance of capacity building activities (trainings for farmers and health/community workers, etc.)	x	x	x	x	x	x	x	x	x	x	x	x	MOH
Structured team reviews to identify gaps, challenges, and opportunities; course-correction	- Program implementation and quality assurance; - Program review, progress, and course correction; risk management	x	x	x	x	x	x	x	x	x	x	x	x	CHAI (internal)
Bi-annual summary reports to DFID, MFAT on program progress s9(2)(ba)	Program implementation and quality assurance; - Program review, progress, and course correction; risk management	x		x		x		x		x		x		DFID, , MFAT s9(2)(ba)

s9(2)(ba)

Clinton Health Access Initiative

Reducing Malnutrition and Increasing Agricultural Incomes through Local Production of Complementary Foods

2016 Report

Table of Contents

A. Executive Summary 2

B. Introduction and Context 5

C. Output Review 7

Output 1: Companies established with financial model that enables quality, nutritious complementary food product to be available for government purchase *7*

Output 2: Farming cooperatives / unions equipped to engage effectively with the production of a high-quality, nutritious complementary food *13*

Output 3: Supply chain for getting complementary food product from factory to homes is efficient and effective *24*

Output 4: Demand, uptake and consumption of complementary food product by the poor is optimal *28*

Output 5: Evidence is generated on the effectiveness of the complementary food product to inform replication of the approach in other contexts *33*

D. Value for Money 36

E. Risk Management 38

F. Monitoring & Evaluation 40

G. Sustainability and Exit Planning 47

Annex: Information Sheet for FBF Beneficiaries in Rwanda 48

A. Executive Summary

In partnership with the Government of Rwanda, the Clinton Health Access Initiative (CHAI) made significant progress during 2016 on the roll-out of a national nutrition program aimed at reducing the rate of chronic malnutrition, or stunting, among Rwandan children. In 2015, CHAI facilitated the launch of a joint venture comprised of the Government of Rwanda and four private investors to build a state-of-the-art production facility for fortified blended food (FBF) in Rwanda. This joint venture, Africa Improved Foods (AIF), completed factory construction during 2016, with initial product runs starting in the fourth quarter of the year. By the end of the year, AIF had produced batches of two types of FBF for the Government of Rwanda: one formulation specifically tailored for infants and young children from six to 23 months of age; and one formulation for pregnant and lactating women (PLW). As of the end of 2016, these batches were undergoing regulatory reviews in preparation for launch to beneficiaries in early 2017. AIF also produced an initial batch of SuperCereal Plus for the World Food Programme (WFP), which had cleared WFP's independent quality testing as of the writing of this report.

In preparation for product launch in Rwanda, CHAI worked closely with the Ministry of Health during 2016 to develop the supply chain systems and health messaging to ensure that FBF is accessible to eligible households and used appropriately, to maximize the program's impact on nutritional outcomes. CHAI hired a team of supply chain specialists to undertake scenario planning with the Ministry of Health's Medical Procurement and Production Division, mapping out available capacity within the health system supply chain for transportation and storage, and proposing options to expand that capacity to handle the projected FBF volumes. With this support, detailed delivery plans are in place to move initial volumes of FBF to Rwanda's network of approximately 500 health centers, and systems have been rolled out for stock management, forecasting, and re-ordering. CHAI also worked with the Ministry of Health and the Nutrition Technical Working Group to develop educational materials for nurses, Community Health Workers, local officials, and beneficiaries themselves to disseminate a clear set of messages regarding product storage, preparation, and consumption, as well as the importance of breastfeeding. Finally, CHAI contracted the London School of Hygiene and Tropical Medicine to provide technical support on the evaluation plans for the Rwanda program during 2016, leading to the development of an updated study protocol to measure the program's impact on stunting and micronutrient status.

Rwanda and neighboring countries were hit by a significant drought in 2016, depressing maize yields and driving up the prices of maize and other agricultural goods. CHAI's agricultural support program, consisting of dedicated extension agents and low-interest loans for partner cooperatives, appears to have helped nearly 12,000 farmers to maintain reasonable yields during an otherwise challenging season. However, despite significant efforts during 2015 to formulate flexible procurement contracts between AIF and partner cooperatives, the market price of maize went above the ceiling price in the contracts and cooperatives were not able to deliver maize to AIF on the agreed terms. AIF was able to source agricultural inputs for production from traders, albeit at higher cost than planned. However, the challenges encountered in the agricultural work to date have led CHAI to reassess the model for this aspect of the nutrition program. Going into the 2017 season, CHAI is undertaking a targeted pilot project focused on post-harvest infrastructure, while undertaking a broader review of our agriculture strategy.

CHAI continued to work towards the launch of a joint venture similar in structure to the Rwanda model in Ethiopia during 2016. CHAI facilitated negotiations between the AIF holding company and the Government of Ethiopia on outstanding points in the joint venture agreement, particularly around tax exemptions and profit sharing, with the result that these points are largely resolved. CHAI also supported AIF with updates to the Ethiopia business model using local market data, and by helping with due diligence on a potential local partner in the joint venture, s9(2)(ba) . As of the end of 2016, AIF has completed their company registration in Ethiopia, and has paid a deposit on a factory site in an industrial zone near Addis Ababa. The joint venture agreement is still pending signature. The process was slowed down by the political unrest in Ethiopia during 2016, which resulted in changes in key government roles, but is expected to move forward during 2017.

CHAI provided support to AIF during 2016 to scope the commercial market for FBF products in East Africa. CHAI leveraged our country presence to gather information on the competitive landscape, local producers, and major retailers and distributors across s6(a) CHAI compiled this information into a report for AIF, which AIF has incorporated into their commercial strategy. s9(2)(ba)

Finally, CHAI undertook scoping efforts in 2016 to assess the potential to expand the nutrition program to three additional countries: s6(a) In each country, CHAI focused on understanding the country context, particularly mapping what households currently feed to children in the 6-23 month age range; what commercial products are available for complementary feeding; and what nutrition and social support programs are in place that could be leveraged for subsidized FBF distribution. s9(2)(ba)

As a particular focus, CHAI looked at the markets for maize and soybean to both look at prices and understand the major players, as a first step towards developing a tailored agricultural program in each country. This initial scoping work indicates good opportunities for profitable businesses in each country context, with varying sources of demand. Each country also has means of reaching the poorest and most vulnerable groups with subsidized FBF.

While the project continues to advance and the opening of the Rwanda factory and the start of distribution of food in Rwanda are heartening, there is a fundamental strategic challenge that must be addressed successfully in the coming year or two for the project to succeed as planned.

The ultimate goal of the CHAI nutrition project was to create a sustainable business model to combat chronic malnutrition in Africa that did not depend on foreign subsidies. Currently, there are no African factories that can produce highly nutritious infant food (food that includes sufficient animal protein, lipids, vitamins and minerals, and energy) at sufficient quality. The model depends on providing an attractive proposition for investors to make investments in the production of high-quality, nutritious food in Africa, based on African agriculture, at a competitive cost to imported products; and on partnerships with governments to use government funds to distribute the product to those who cannot afford it, and to sell the product affordably to those would can afford to purchase it.

The model assumed that ultimately, the factories would develop a profitable and growing commercial market as African incomes per capita rise, and that profits would be shared with participating governments to allow them to pay for the subsidized food for their poor citizens.

CHAI estimated that it would take about five years to develop a large enough commercial market for the first few factories. During this five year period, the factories would supply the WFP with SuperCereal Plus at a full cost plus ten percent profit, as long as the product was competitively priced with delivered product from Europe. This was attractive to WFP because WFP could not find sources in Africa that could produce SuperCereal Plus at sufficient quality; WFP anticipated demand for SuperCereal Plus growing in East Africa; and WFP has a mandate to support local agriculture.

When the initial estimates of cost for the factory were made, the delivered cost for SuperCereal Plus produced in Europe and delivered to Africa was over s9(2)(b)(ii) per ton and had been at those levels for a number of years, and the factories in Rwanda and Ethiopia could be competitive, and so the model seemed to be feasible.

Since then, there has been a "perfect storm" of challenges that have arisen with the s9(2)(b)(ii)

grain and bean prices in Europe have declined dramatically while drought in East Africa due to El Nino has meant a rise in the prices of agricultural inputs in the region. Similarly, energy prices have declined in Europe and not in Rwanda.

As a result, s9(2)(b)(ii)

CHAI is therefore reorienting some of its activities to assist the company in these efforts to accelerate the commercial market, in addition to assisting the government of Rwanda to combat chronic malnutrition using the food now being produced in the factory.

The good news is that CHAI and AIF both believe that there is a sufficiently large potential commercial market – and the prices in that market now being served by imported products or inferior products produced in Africa are high enough – to produce significant profits for the factory. But it will be challenging to develop the market quickly.

DSM, the lead investor, remains committed to the success of the project and is also committed to expanding to Ethiopia, where the potential commercial market is bigger, and energy and agricultural commodity costs are lower.

The sustainability and ultimate success of the project will now depend on the ability to accelerate the development of the commercial market.

B. Introduction and Context

With support from the s9(2)(ba) the New Zealand Ministry of Foreign Affairs and Trade (MFAT), the s9(2)(ba) and the U.K. Department for International Development (DFID), CHAI is undertaking a multi-country effort to rapidly reduce the incidence of chronic malnutrition, or stunting, in children under five. In many of CHAI's partner countries, more than 40% of children are stunted, resulting in impaired cognitive development and weakened immune systems. Stunting is the single greatest predictor of death in children under five, and undernutrition is associated with 45% of child deaths, contributing to 3.1 million deaths annually.[1] Stunting rates increase steeply for children between six months and two years of age, when breastfeeding alone does not provide adequate nutrients to support healthy growth and development, and many households struggle to access high-quality complementary foods.

CHAI has worked with partners, including the WFP and DSM, to develop a nutrient-dense FBF formulation that can be produced locally, based primarily on local agricultural products. The FBF can be prepared as a porridge, which is aligned with current consumption practices for 6-23 month olds across CHAI's partner countries. The formulation is specifically designed to fully meet the nutrient needs of 6-23 month olds, who should both breastfeed, when possible, and receive a high-quality complementary food. The formulation is based on WFP's SuperCereal Plus, and contains maize, soybeans, soybean oil, sugar, skim milk powder, and a micronutrient blend. While processed complementary foods are available on the commercial market in CHAI's partner countries, these products are often not sufficiently nutritious – many lack key macro- and micro-nutrients, have excessive sugar levels, and do not have sufficient quality controls. The high-quality, nutritious products that are available are typically not affordable to the populations that need them most.

To enable long-term sustainability, CHAI and partners developed a commercially viable business model for local production of FBF, s9(2)(b)(ii) The business model allows for s9(2)(b)(ii) for subsidized distribution to poor and vulnerable groups, who tend to have the highest rates of stunting. Local production both enables affordable product access and promotes the development of national food processing industries, adding value to staple crops and opening new avenues for export growth. CHAI is facilitating the launch of local joint ventures to produce FBF under this business model with investor funding, separate from the donor funds supporting CHAI. In Rwanda, new ("greenfield") factory construction was considered favorable to working with existing production facilities as this compared favorably in cost to retrofitting existing facilities and quality is of utmost concern when feeding vulnerable populations. As CHAI looks at new countries for expansion, existing facilities may also be used.

By procuring maize and soybean for FBF production in-country, the project is intended to support agricultural sector growth and provide a market for smallholder farmers, who comprise a significant portion of the population in CHAI's partner countries. CHAI has sought to facilitate mutually beneficial

[1] Black, R, et al. *Maternal and child undernutrition and overweight in low-income and middle-income countries.* The Lancet, published online June 6, 2013.

contracts between cooperatives of smallholder farmers and the new joint venture in Rwanda, and use these contracts to secure low-interest loans that farmers can use to purchase improved inputs for production. CHAI worked with the International Finance Corporation (IFC) to develop a revolving loan fund to support farmers' cash requirements during the long growing season, with repayment at the time of crop sales to the local production facility. In cooperation with the relevant government partners, and with both technical and financial support from MFAT, CHAI provided extension support for partner cooperatives in 2016 in both Rwanda and Ethiopia, improving the transmission of best practices to maximize yields and crop quality. These efforts are intended to improve farmers' yields and crop quality, and reduce their cost of production, allowing the local ventures to purchase high-quality inputs for FBF production from local farmers.

CHAI has worked with government partners in Rwanda to develop product distribution and promotion systems to drive uptake and appropriate product use at the household level. CHAI has developed a number of tools and resources for the Rwanda project that will be useful models as the program expands to Ethiopia and other settings. In both Rwanda and Ethiopia, CHAI is supporting government-led campaigns to promote exclusive breastfeeding in the first six months, and continued breastfeeding through the first two years. During 2016, CHAI worked with the Government of Rwanda to finalize a formulation for FBF for PLW, ensuring that women in the poorest households are adequately nourished while pregnant and nursing.

A rigorous monitoring and evaluation plan is critical to understand the project's impact on nutritional status and to course correct as needed. Since Rwanda will be the first setting where FBF is rolled out, CHAI has developed an intensive evaluation plan to understand the impact of FBF on stunting rates in Rwanda. This includes coverage surveys and a process evaluation, along with an impact evaluation. In Ethiopia, CHAI is considering a short-list of potential evaluation designs with support from technical experts. In both countries, CHAI has established a monitoring system to track progress in agricultural activities. In Rwanda, CHAI has worked with the Ministry of Health to develop systems to monitor distribution and product uptake, to begin at the time of product launch.

CHAI is undertaking the initial phase of this project in partnership with the Governments of Rwanda and Ethiopia. Both countries are deeply concerned about the impact of chronic malnutrition on their human and economic development, and have a track record for rapidly implementing promising new programs. Over the coming years, CHAI will look at the potential to expand the program to up to five new countries in s6(a) New program countries could adopt the same model as the initial phase, or adapt the approach to suit their context.

C. Output Review

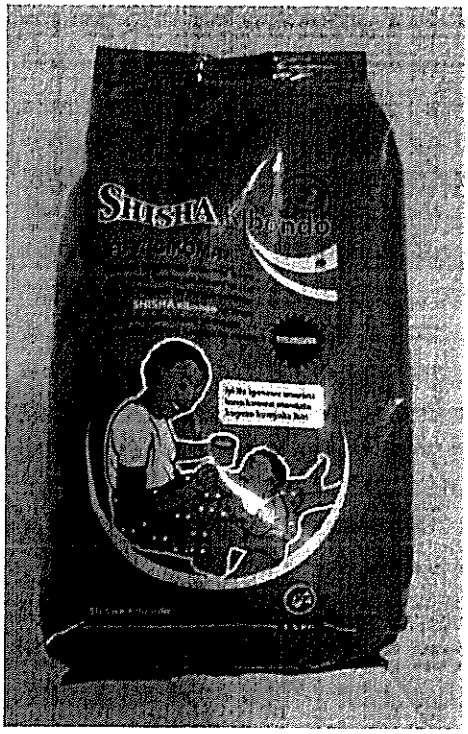
Output 1: Companies established with financial model that enables quality, nutritious complementary food product to be available for government purchase

Indicator	Target in 2016	Achieved by December 2016	Proposed 2017 Target
Indicator 1.1 Joint venture agreements in place with government partners, s9(2)(b)(ii)			
	Legal agreement in place in Ethiopia; Scoping notes completed for Phase 2 countries	Legal agreement still pending signature in Ethiopia Scoping notes completed for Phase 2 countries	Legal agreement in place in Ethiopia
Indicator 1.2 Government purchase volumes (MT)			
	N/A	N/A	3,000 MT Rwanda N/A Ethiopia

Progress towards output

In a major 2016 milestone, the AIF factory in Rwanda began producing fortified blended food (FBF). AIF worked through a series of external challenges to the business model during 2016, making adaptations to their cost structure and marketing plans accordingly, with CHAI support. In Ethiopia, CHAI continued to support negotiations between the Government of Ethiopia and the AIF investors, reaching agreement on key negotiating points such as tax exemptions. However, given the political unrest in Ethiopia during 2016, the agreement was unable to be finalized in 2016. AIF hopes to re-engage with the Government of Ethiopia in early 2017, with the goal of signing an agreement in the first half of 2017. CHAI also compiled reports on the feasibility of launching programs with a similar business model in s6(a)

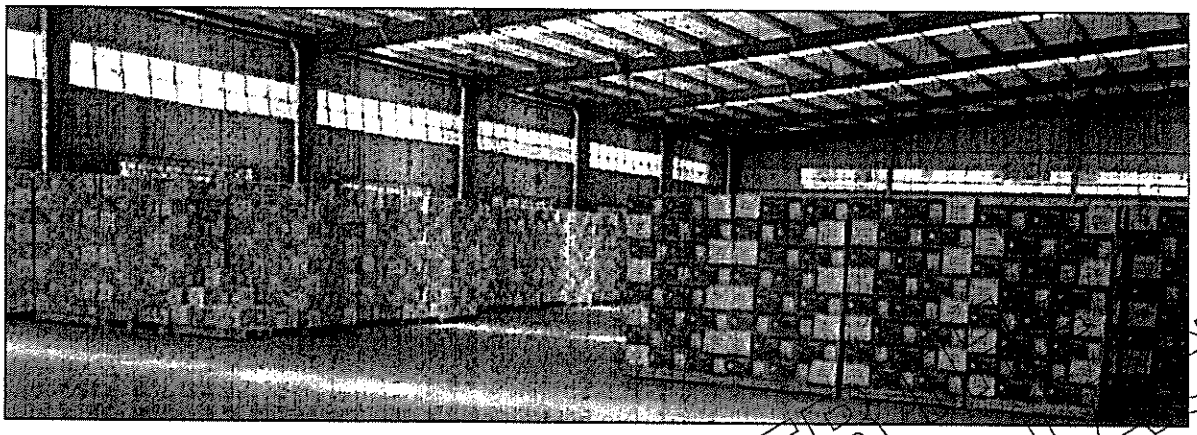
Figure 1: Package of AIF Children's FBF



FBF Production in Rwanda

The AIF team kept to a tight construction schedule throughout 2016, and the factory opened as planned in the fourth quarter of 2016. AIF began producing the two

Figure 2: Boxes of FBF for children (green) and PLW (yellow) at the AIF warehouse



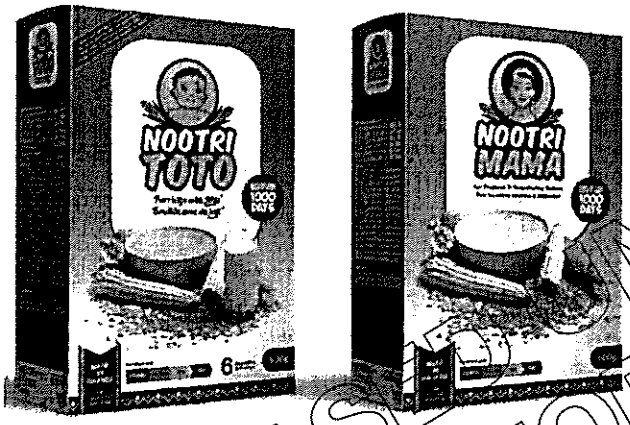
FBF products for the Government of Rwanda, one variety for infants and young children and another for PLW (see Figures 1 and 2). Product samples were sent to the Rwanda Bureau of Standards for quality testing and approval in December 2016. As of the writing of this report in January 2017, the Rwanda Bureau of Standards has approved the samples and the Ministry of Health has begun distribution. AIF also began producing SuperCereal Plus for the WFP in December 2016, with about 400 MT produced and accepted by WFP's quality team. The December production runs demonstrated that AIF is able to produce quality product at a reasonably high load. The AIF facility passed a WFP quality audit, as well as the first phase of a Société Générale de Surveillance (SGS) audit for FS 22000 certification.

s9(2)(b)(ii)

AIF has developed a commercial market strategy with product launch planned in Rwanda in February 2017, followed quickly by product introduction into s6(a) in March and s6(a) in April 2017. AIF plans to leverage widespread awareness of the importance of the first 1,000 days in their marketing,

with particular brand values of "balanced nutrition" and "international quality." See proposed branding in Figure 3. The AIF team has conducted a retail mapping for s6(a) that will guide initial product launch, and is developing plans for a communications campaign via mass media. Distribution to neighboring countries will be handled through bonded warehouses at the borders, and partnerships with distributors in-country.

Figure 3: Proposed branding of AIF commercial products for children (left) and PLW (right)



COMMERCIAL PRODUCT PACK

The same cost changes have pushed up the price of the FBF sold to the Ministry of Health, which is agreed to be sold on an at-cost basis. The estimated weighted average price between the children's FBF and the FBF for PLW is about s9(2)(b)(ii) per MT, in the initial year of production. This cost is expected to come down over time. Because the Ministry of Health agreed to s9(2)(b)(ii)

This volume is sufficient to fully cover s9(2)(ba) children and PLW, because in the process of beneficiary enrollment it became clear that there are fewer eligible children and PLW in s9(2)(ba) than previously estimated (see more information under Output 3). In fact, the Ministry of Health can afford to purchase more FBF than is needed to fully cover s9(2)(ba), and so is also planning to provide FBF at no cost to s9(2)(ba) households in the ten districts of the country with the highest stunting rates. This is expected to start by the second quarter of 2017.

Joint Venture Facilitation in Ethiopia

In 2016, CHAI played an active role in supporting the joint venture negotiations between the Government of Ethiopia and AIF, seeking to resolve outstanding negotiation points. CHAI solicited support from the Office of the Prime Minister, the Ministry of Health (MOH), and the Ministry of Public Enterprise (MPE) to review AIF's tax requests, briefing officials at these agencies as well as the Ethiopian Investment Commission on the project. CHAI helped to interpret and clarify the Government's response

to AIF's requests, provide feedback to the AIF negotiation team, and integrate the proposed changes into the joint venture agreement. CHAI then organized a high-level meeting with officials at the MPE to discuss the updated agreement. s9(2)(b)(ii)

The delays in joint venture signature have been due primarily to the unrest in Ethiopia during 2016 and resulting upheaval in key Government positions. The joint venture agreement should move forward to signature in the first half of 2017.

CHAI facilitated the acquisition of a land site for AIF in the Eastern Industrial Zone (EIZ), outside Addis Ababa. CHAI scoped out the location and met with the management of the EIZ to get AIF's key questions answered, feeding information on the site back to AIF management. AIF subsequently contracted an engineering company to do a full site survey and develop preliminary construction plans. s9(2)(b)(ii)

CHAI provided support for AIF to conduct due diligence on a potential local company partner, s9(2)(ba) has strong brand recognition across Ethiopia and could allow AIF to quickly tap into the commercial market in Ethiopia. Members of the CHAI team performed analysis of s9(2)(ba) financials and contracts for AIF's finance team during 2016 as part of AIF's due diligence process. CHAI has also facilitated negotiations between AIF and s9(2)(ba) which are ongoing, with a decision expected by the AIF Board in 2017.

In order to update the Ethiopia business case, CHAI provided frequent updates to the input price and volume data in the business model. CHAI collected price and volume data on maize and soybean from commercial farms and traders, sharing these data back with AIF. CHAI also assessed local and imported packaging options, identifying the best options for AIF and securing price quotes and samples from short-listed companies. In order to assess the availability and price trends of locally produced and imported FBF, CHAI conducted regular market surveys in Addis and regional cities, visiting small shops as well as medium-sized and large supermarkets. These surveys showed that the price of imported FBF is increasing due to a shortage of hard currency in Ethiopia, and imported FBF products are not regularly available in markets. This offers an opportunity for AIF to gain market share with a high-quality product competing with imported brands.

Business Model Development in Scoping Countries

During 2016, CHAI worked to assemble background information and business models for the three countries earmarked for potential expansion of the nutrition program: s6(a)
Each country looked at the input costs for FBF production, gathering data on trends in agricultural prices and local prices for energy, fuel, water, and staff. In each country, CHAI also put together a preliminary model of potential sources of guaranteed demand, including both profitable sources of FBF and opportunities for at-cost sales to partner agencies for distribution to at-risk populations. CHAI's goal in

the scoping work has been to both build a business case that could be made to potential investors interested in local FBF production, and outline the structure of a comprehensive program to use locally produced FBF to improve nutritional outcomes.

s6(a) CHAI built on earlier fieldwork by conducting a study of households' reported willingness to pay for a processed complementary food. This study indicates that a large middle-income market could be tapped in rural and urban areas by producing a "premium" complementary food, particularly one including milk powder, and offering it at a competitive price: around s9(2)(b)(ii) per metric ton (MT), according to the results of the study. The business model projections for s6(a) indicate that FBF could be produced for significantly less, allowing for a significant profit margin. A "value" market could also be tapped by entering the market at a price of around s9(2)(b)(ii). s6(a) has a number of partner organizations purchasing FBF for distribution to vulnerable households through food security, school meals, and nutrition programs; these partners are eager to source high-quality FBF locally and may be able to provide purchase guarantees to a new company. A key risk in s6(a) is the availability and cost of agricultural inputs: productivity of maize and soybeans tends to be low and highly variable; and the government often intervenes in the maize market, inflating prices in an effort to support farmers.

As one of Africa's largest economies, s6(a) has a massive domestic market for FBF. Based on CHAI's initial estimates of the market size and competitive landscape, a factory could rely wholly on "premium" domestic product sales for profitability. While many complementary food products are available from international companies, high prices – starting at over s9(2)(b)(ii) for lower-end products, and going up to more than s9(2)(b)(ii) for higher-end products – put these options out of reach for most s6(a) CHAI's business model projects that FBF could be produced in s6(a) for less than $1500 per MT, allowing a new company to enter the market at a competitive price point while making considerable profits. s6(a) has tremendous need for food support, with high rates of both stunting and wasting particularly in the s6(a) and a number of new nutrition initiatives getting underway with government and partner support that could be leveraged for FBF distribution. s6(a) will s6(a)

s6(a) offers opportunities for FBF markets through both commercial sales and subsidized distribution via the national Social Cash Transfer Program, which is well-supported by government and partners. s6(a) has a significant middle- and upper-middle class population and a strong network of grocery chains for distribution in urban and peri-urban areas. A complementary food produced locally by s6(a) has gained significant market share by marketing a very similar product to s6(a) s6(a) at about half the price. This could represent either an opportunity or a risk: s6(a) appears to have very good quality standards, and it is possible that a new company could partner with s6(a) to expand production capacity and tap into new markets, capitalizing on s6(a) existing brand recognition. s6(a) has well-developed markets for agricultural goods, with a number of potential models for working either directly with farmers or through established maize market intermediaries. s6(a) is politically stable, with few major investment risks.

Challenges and Lessons Learned

In Rwanda, the unexpected challenges to the business model over the past year have created hurdles for the investors. Some of these challenges - such as the euro-dollar exchange rate, extremely low commodity prices in Europe, and El Niño – were unavoidable, but going forward, CHAI plans to test the business case for new countries with more varied and extreme sets of input data to understand the impact on the business model's bottom line. s9(2)(b)(ii)

The key lesson learned is to have a commercial sales strategy ready to launch from the outset. CHAI has worked to help accelerate the development of this strategy for the Rwanda factory, and commercial sales are expected to start in early 2017. CHAI is also looking more closely at commercial market opportunities from the early stages of scoping in new countries.

In Ethiopia, the major external challenge continued to be the delay in the legal formation of the joint venture which, in turn, caused unforeseen delays in initiating and aggressively engaging in other planned activities. The delays may in the long run benefit the joint venture in Ethiopia, as the Ethiopia model will incorporate lessons learned from the Rwanda experience to date, in particular focusing early on commercial sales. CHAI has continued to support the negotiation process through liaising and lobbying the Government of Ethiopia and AIF, and the joint venture agreement is expected to be signed in 2017.

Output 2: Farming cooperatives / unions equipped to engage effectively with the production of a high-quality, nutritious complementary food

Indicator	Target in 2016	Achieved by December 2016	Proposed 2017 Target
Indicator 2.1 Percent of partner cooperatives provided with support to procure high-quality post-harvest infrastructure (dry sheds, storage, and pavement)			
	40% Rwanda	88% Rwanda	TBD
	N/A Ethiopia		TBD
Indicator 2.2 Percent of total maize and soybean volumes required for production procured locally			
	50% Rwanda	36% of maize and <1% of soy procured locally in Rwanda (23% in aggregate)	TBD
	N/A Ethiopia		TBD
Indicator 2.3 Percent of farmers in partner cooperatives reporting having received extension advice during the last season			
	80% Rwanda	86% Rwanda	TBD
	N/A Ethiopia	N/A	TBD
Indicator 2.4 Percent of partner cooperatives aligned with national gender policies			
	85% Rwanda	75% Rwanda	TBD
	Gender analysis completed - Ethiopia	Gender analysis completed in Ethiopia	TBD
Indicator 2.5 Total smallholder farmers reached with improved agricultural technologies (broken down by gender)			
	11,400 Rwanda	11,900 Rwanda	TBD
	N/A Ethiopia	N/A	TBD

Progress towards output

CHAI made a number of targeted improvements to the agriculture program in Rwanda in 2016, with the goal of improving farmers' yields and increasing AIF's procurement of maize from the program's partner cooperatives. CHAI implemented a new model for extension support, placing agronomists with the sector government corresponding to each partner cooperative. This model appears to have been successful, with positive feedback from stakeholders and farmers' yields remaining above the national average during a challenging season. However, with a difficult growing season across the region, maize prices on the open market exceeded the prices offered by the AIF contract, resulting in widespread sales to alternative buyers. The high market prices counterbalanced to an extent the difficult growing season for farmers, allowing farmers to bring in a good income from their crop. s9(2)(b)(ii)

Given the ongoing challenges with the agriculture model, CHAI is undertaking a strategic review to look at alternative means of supporting farmers and helping AIF source high-quality grain, while piloting a targeted approach to maize sourcing during the 2017 Season A harvest.

Cooperative Strengthening

In Rwanda, CHAI worked with eight cooperatives selected in partnership with the Eastern Province government for their organization, productivity, and anticipated capacity to fulfill contracts with AIF. Six of the cooperatives were part of the program in 2015, while two were new to the program. Given the difficulties enforcing contracts after the 2015 growing season, CHAI and partners put additional effort into developing contract terms with agreement from the cooperative leadership as well as members. CHAI and AIF put together a few options for pricing and presented these options to cooperatives for discussion. s9(2)(b)(ii)

After the cooperatives had agreed to the contracts, CHAI seconded dedicated agronomists to the sector governments where each cooperative was located. This approach to embedding extension support within local government was strongly recommended by stakeholders following the 2015 season, in order to increase local ownership and hold cooperatives accountable for results. With technical support from the TA team hired by MFAT, CHAI provided training to the agronomists throughout the year to build their capacity to provide the cooperatives with effective support.

This extension support appears to have been helpful in supporting farmers in partner cooperatives during a difficult season in Rwanda. Insufficient rainfall during the planting and growing seasons seriously impacted farmers' yields, particularly in the Eastern Province, where the partner cooperatives are located. CHAI's post-season surveys indicated that farmers in the program's partner cooperatives achieved average maize yields of 2.1 MT per hectare, while the national average maize yield during the same season was 1.76 MT/ha. The yields represented a slight decline from 2015 Season A yields, given the El Niño conditions affecting the region. However, these figures imply that the partner cooperatives outperformed the national average by just over 19%, which may be in part attributable to the agronomists' support. In the post-season surveys, 86% of farmers reported having received support from extension agents during 2016. CHAI also received very positive feedback from partner cooperatives and from local government on the performance of the team of agronomists.

Table 1: Farmers accessing improved agricultural technologies in 2016 Season A – Rwanda

Cooperative Name	Registered Members		Affiliates		Total – By Gender		Total
	Female	Male	Female	Male	Female	Male	
s9(2)(a)	464	619	0	0	464	619	1,083
	168	562	0	0	168	562	730
	413	341	0	0	413	341	754
	1,521	2,100	0	0	1,521	2,100	3,621
	887	924	0	0	887	924	1,811
	17	97	183	215	200	312	512
	14	36	802	1,486	816	1,522	2,338
	61	384	156	450	217	834	1,051
Total	**3,545**	**5,063**	**1,141**	**2,151**	**4,686**	**7,214**	**11,900**

In Ethiopia, CHAI completed cascade training in early 2016 aimed at building the management capacity of unions and primary cooperatives. The topics covered included internal cooperative management and leadership, quality management, value chain development, business plan development, and Planning, Monitoring and Evaluation (PME) systems. After completing a training-of-trainers, the trainers in turn trained cooperative extension workers and cooperative executive committee members on these topics. In total, 277 leaders participated in the training of trainers: 13 government officials at the zonal and district levels, 19 union staff, 40 cooperative extension workers, and 205 primary cooperative executive committee members. CHAI facilitated the trainings and compiled a report on the training-of-trainers and the cascade trainings for circulation to the stakeholders involved.

Table 2: Potential partner cooperatives and member farmers in Ethiopia

Union Name	Primary Cooperatives	Male members	Female members	Total
s9(2)(a)	6	1,886	544	2,430
	6	2,403	176	2,579
	6	3,012	289	3,301
	6	6,592	663	7,255
	6	3,046	246	3,292
	6	1,529	260	1,789
	6	2,868	173	3,041
	6	2,606	512	3,118
	6	1,080	228	1,308
	6	5,631	637	6,268
	6	1,888	246	2,134
Total	**66**	**32,541**	**3,974**	**36,515**

Access to Financing

s9(2)(b)(ii)

CHAI continued to implement the program's farmer financing model in Rwanda in 2016, with the IFC providing a pool of funds and local bank partner administering the loans. The loans are made at the cooperative level, with the cooperatives then organizing payments to input suppliers, distribution of inputs and funds to farmers, and repayment by farmers at the end of the season. Of the eight partner cooperatives that signed contracts with AIF, six cooperatives received loans from for the 2016 maize season. One cooperative had outstanding debts that made it ineligible to receive further funding, while another decided not to take a loan given challenges with repayment in 2015. The total amount of the loans taken by the six participating cooperatives was approximately s9(2)(b)(ii) Not all farmers within the cooperatives chose to take part in the loan: according to CHAI's post-season surveys, of farmers took a loan in 2016. s9(2)(b)(ii)

s9(2)(b)(ii)

Access to Agricultural Inputs

s9(2)(b)(ii)

While nearly all farmers used improved seed in 2014 and 2015, the percent of farmers using improved seed in 2016 dropped to 76%. The government has been rolling back subsidies for hybrid seed, moving from a 100% subsidy in 2014 (reflected in 100% uptake of hybrid seed) to a 75% subsidy in 2015 and 2016. s9(2)(b)(ii)

with 98% of farmers using improved seed in 2015. In 2016, however,

s9(2)(b)(ii)

Uptake of inorganic fertilizers remained high, with more than 80% of farmers purchasing urea and DAP, and the average amount used exceeding recommended levels. Use of organic fertilizer also remained high at 86%, with farmers increasing use in Season A 2016 to more than 4,800 kg per hectare, only 3.5% shy of the recommended level of 5,000 kg per hectare.

Table 3: Input Use Reported by Farmers in Partner Cooperatives, Season A 2016 – Rwanda

Input	% of Farmers Reporting Use	Average Quantity Used per Ha	Recommended Quantity per Ha
Improved Seed	76%	38 kg	25 kg
Local OPV Seeds	26%	55 kg	0 kg
Urea	82%	76 kg	50 kg
DAP	86%	125 kg	100 kg
Org. Fert.	86%	4,823 kg	5,000 kg
Pesticide	11%	2 kg	as needed

In Ethiopia, CHAI focused agricultural activities on soybean productivity during 2016. Compared with maize, there is a less stable market for soybean in Ethiopia, which has resulted in less investment in and attention to soybean in terms of training and other capacity-building support to farmers. CHAI's agricultural baseline survey indicated that the average soybean productivity was 1.5 MT/ha, which is considerably higher than the latest reported soybean yields in Rwanda (0.6 MT/ha, per the Government's Seasonal Agricultural Survey for Season A 2016), but very low compared to the potential yields of 4 MT/ha if improved soybean varieties and technologies are used.

Cognizant of this yield gap and the time that it will take to develop soybean productivity, CHAI has invested in training and demonstrations of improved soybean technologies, in partnership with agricultural research centers and agricultural offices focused on soybean technology dissemination. Prior to the launch of capacity building activities, CHAI organized a consultation meeting involving regional government officials, subject matter specialists, soybean researchers and extension workers (82 participants in total, across two sessions). The purpose of the meeting was to identify promising technologies and efficient crop management methods, along with knowledge gaps and training needs, in order to design and implement a tailored training program. CHAI then trained a total of 246 participants on improved soybean technologies, including 121 lead farmers, 82 Development Agents, 26 supervisors, eight District Agronomists and nine zonal experts.

Subsequent to this training, CHAI supported the establishment of 160 soybean demonstration sites: 128 sites managed by lead farmers, and 32 sites managed by Farmer Training Centers. The demonstration sites are designed as group learning tools for smallholder farmers and extension workers. The

demonstration field at Farmer Training Center sites has four 10 meter by 10 meter (100 m^2) plots using four treatments to test the effects of varying technology application, i.e.:

- Improved soybean seed + Rhizobium (+R)
- Improved soybean seed + DAP/NPS (+P) blended fertilizer
- Improved soybean seed + Rhizobium + DAP/NPS (+R, +P) blended fertilizer combination
- Improved soybean seed alone (-R, -P)

Under the lead farmers' demonstration plots, and with the support of the Development Agents, 3,924 farmers were trained on crop management at each plant growth stage, including planting, flowering, maturation, and harvesting. This process served to both strengthen the skills of smallholder farmers, and also allowed the extension agents to develop their skills in delivering extension services for soybean. Additionally, a total of 36 field days were organized in collaboration with the Agriculture Office, reaching 8,541 farmers. During the field days, farmers were oriented on the importance of soybean crop management and inoculant application. During discussions at the field days, participants commented that the plants grown in the plots receiving both Rhizobium and DAP/NPS blended fertilizer had more numerous and bigger pods than plants grown in the other plots. Farmers were eager to access the new technologies and improved varieties to improve their own production.

Table 4: Summary of soybean technology dissemination activities

Union Name	No of Demo Sites	Farmers Groups Organized	Trained Farmers			No of Field Days	Field Day Participants		
			Male	Female	Total		Male	Female	Total
s9(2)(a)	30	24	721	126	847	6	1617	210	1827
	20	16	372	21	393	4	1425	283	1708
	35	28	809	188	997	7	1178	425	1603
	15	12	400	247	647	3	366	110	476
	15	12	208	62	270	3	609	125	734
	25	20	485	165	650	5	745	211	956
	20	16	96	24	120	8	942	295	1237
	160	**128**	**3091**	**833**	**3924**	**36**	**6882**	**1659**	**8541**

CHAI and partners are monitoring yield data from the demonstration plots on a regular basis. Based on the data gathered to date, the demonstration plots are showing considerable improvements over the baseline soybean yields of 1.5 MT/ha: the farmer-run demonstration plots are seeing yields of 2 – 2.4 MT/ha, while the demonstration plots at Farmer Training Centers are yielding 2.6 – 2.8 MT/ha. These data along with feedback from participants have been valuable in identifying what worked well and what did not work well in the demonstration sites. This will allow for improvements to the program in the coming year (see Table 5 for details).

Table 5: Summary of key findings from soybean field days

Benefits of the Field Days	Challenges	What will be done differently next time?
• The field days create an avenue for discussion between farmers, researchers, extension workers and local leaders • Participants were taken around the fields to see various treatments - this creates awareness of the program for the farmers to engage in soybean production using inoculants and NPS fertilizer • Created an opportunity for farmer-to-farmer interactions and dissemination of ideas • In most plots, effects of fertilizers and inoculants were clearly shown - Farmers expressed interest in adopting agronomic practices seen on lead farmers' fields	• Lack of site selection skill – Soybean demonstrations have responded differently to technologies; in some places, control plots performed better than intervention plots • Best agronomic practices were not consistently applied in some Farmer Training Center fields • The field day was conducted late when the crop was already dry due to instability of the region	• CHAI and Research Centers will work together to increase site selection capacity of extension workers • CHAI will support organization of mini and major field day at different stages of the crop - i.e. vegetative stage and at harvest • CHAI and the Agriculture and Natural Resources team will work with technical assistance providers to strengthen the delivery of best practices to the farmer

Reducing Harvest and Post-Harvest Losses

In Rwanda, all of the partner cooperatives benefited from some improvements to their post-harvest infrastructure during 2016. [redacted] offered to purchase equipment for the cooperatives as a corporate social responsibility project, and CHAI then supported [redacted] to identify appropriate machines, and worked with [redacted] to accelerate the procurement process. As a result, [redacted] provided shelling machines to seven of the eight partner cooperatives in 2016, with CHAI facilitation. Independently, the Ministry of Agriculture donated a store and dryer to three of the eight cooperatives; and WFP donated a solar dryer to one cooperative. The number of farmers reporting access to post-harvest equipment also improved in 2016: according to CHAI's post-season surveys, 70% of the farmers had access to a drying shed, 61% had access to a storage facility, and 49% had access to a pavement in 2016, compared to 64%, 57% and 34% access, respectively, in 2015.

While access to infrastructure is improving, post-harvest processing continues to be a major challenge for farmers, and efficient processing and transportation is one of the major barriers to AIF's procurement of high-quality, affordable maize. Post-harvest losses and high transportation costs contribute to a high price for maize in Rwanda, and the delays in post-harvest processing and in securing reliable transport contribute to critical quality issues in the maize delivered. To address these challenges, CHAI plans to pilot a post-harvest processing model following 2017 Season A. CHAI will be working with a local transportation company, s9(2)(a) to set up a maize processing center with mechanized shelling and cleaning equipment. The station will be co-located with a partner cooperative to benefit from the cooperative's network of farmers and on-site facilities for drying and storage. AIF has agreed to pay a price that is higher than the local market price for Grade II maize, and will more than compensate for the transport cost to deliver the maize to the factory. AIF will advance cash to s9(2)(a) to purchase maize directly from farmers at the processing center. s9(2)(a) will handle the logistics of maize management and transportation to AIF, with a back-up buyer in place for any maize not meeting AIF's quality specifications.

The DAI Inc. team supported by MFAT provided technical support for the development of this model during their December 2016 visit, and their contributions have been incorporated into the planned approach. The model allows s9(2)(a) to act as a buying agent for AIF. The goal is to move maize as rapidly as possible from the field to the factory, minimizing the time when maize is exposed to potential risks from contamination and degradation which impact quality and farmers' marketable volumes. If successful, the model can be rapidly scaled up and make a real contribution to AIF's sourcing requirements. The model should also allow farmers to capture greater value from their crop by reducing the losses typically incurred during harvest and post-harvest processing, and subsequent transport to a buyer.

In Ethiopia, CHAI conducted an audit of current post-harvest processes at three levels: among farmers, at primary cooperatives, and at unions. Through this process, CHAI identified vulnerabilities that expose crops to degradation and/or contamination across the 42 primary cooperatives and seven unions that are potential partners for the program. CHAI gathered the views of primary cooperatives and union leaders on the types of post-harvest infrastructure needed to make processes faster, more efficient, and/or more secure. The key infrastructure gap identified through the assessment was maize shelling

machines. Cooperative leaders further pointed to the need for storage improvements at the primary cooperative level. Most of the primary cooperatives' storage facilities are of poor quality and small in size, which could create challenges for gathering the requisite quantity and quality of crops for AIF. CHAI will assess the costs of the proposed infrastructure improvements to develop cooperative-level infrastructure plans.

The post-harvest process audit indicated limited awareness of appropriate post-harvest crop management among extension agents and cooperative leaders. In response, CHAI organized a cascade training focused on post-harvest management for Agriculture and Natural Resources (ANR) staff, officials responsible for cooperative promotion, and union staff. With the support of the DAI Inc. technical team, a training of trainers (ToT) was organized for 34 regional and zonal experts. Sasakawa Global 2000, a partner with rich experience in post-harvest management of maize, shared their experiences with the ToT participants. The training took a comprehensive approach to maize quality management: understanding quality requirements; reasons to produce high quality maize; and technical methods for quality improvement during growing, harvesting, drying, storage, and transportation. At the end of the training, participants were provided with a checklist indicating key steps at each stage of plant growth for better quality grain.

Following the ToT, CHAI organized cascade trainings in six different locations, reaching a total of 272 participants. The trainees included executive committee members of primary cooperatives, agriculture extension workers, cooperative extension workers, and District Agronomists (see Table 6).

Table 6: Participants in cascade trainings on post-harvest maize management (Ethiopia)

	Male	Female	Total
Cooperative Executive committees (farmers)	109	2	111
Development Agents (DA) from agriculture and cooperative promotion	100	20	120
Agricultural supervisors	15		15
Agronomists	14		14
Cooperative marketing officers	9	3	12
Total	**247**	**25**	**272**

Gender equity

In Rwanda, women continue to be well represented among partner cooperatives overall, although the percent of partner cooperatives complying with government requirements for gender balance dropped from 89% (eight out of nine) in 2015 to 75% (six out of eight) in 2016. This was because the one cooperative not compliant with gender requirements in 2015 remained in the program, and one of the new cooperatives that joined the program in 2016 also did not meet requirements for gender balance. In total, just over 39% of the members of partner cooperatives in Rwanda were female in 2016.

In Ethiopia, CHAI conducted an assessment of the gender strategies of selected partners in order to identify lessons learned and develop a strategy to enhance women's participation in the identified unions and cooperatives. CHAI collected gender-related information from appropriate stakeholders and institutions working in the agriculture sector to extract lessons on how governmental and non-

governmental organizations are approaching gender equality in agriculture, including their successes and challenges. Based on the findings of the assessment, it was agreed to conduct a gender analysis at field level. The DAI Inc. technical team supported by MFAT has committed to support the process. CHAI has drafted a gender analysis tool and shared with the technical team for their input and comments.

Partnerships and Review Meetings

In Rwanda, CHAI worked closely with AIF, the Ministry of Agriculture, the Rwanda Agricultural Board, and Eastern Province officials to monitor progress during the 2015-16 maize season. While AIF led the procurement planning process in 2016, the CHAI team actively participated in these meetings in order to effectively liaise with partner cooperatives and the extension team. s9(2)(b)(ii)

In Ethiopia, CHAI is fostering partnerships with governmental extension agencies, cooperatives and unions through the activities described above. This will make it easier to scale up best practices in maize post-harvest handling and soybean technology dissemination work to increase the income of smallholder farmers and their capacities to deliver maize and soybean to the required standard and volume. Along with CHAI's participation in the soybean technology network in Ethiopia, CHAI is taking part in the maize value chain stakeholders' platform organized by the Agricultural Transformation Agency to jointly undertake activities and avoid duplication of efforts.

Challenges and Lessons Learned

Following harvest, the extension team in Rwanda worked with MINAGRI/RAB to conduct field visits to different areas and secure maize for the factory. The extension agents also assisted with aflatoxin testing to minimize crop rejections by the factory. s9(2)(b)(ii)

While CHAI's support does appear to be having a positive impact on farmers' yields – and the high demand for maize in the past season meant that farmers also got good prices for their maize – the model is not working as originally intended, as the contracts are not resulting in a reliable, local supply of high-quality, affordable grain for AIFL. Lessons learned in this past season include:

- It does not appear to be realistic to expect cooperatives to adhere to forward contracts, if market prices are above the contract price. If forward contracts are used in the future, contracts should have floating prices pegged to market prices.
- Many cooperatives are struggling to effectively manage contracts and loans. Even with an increased focus on sensitizing member farmers during 2016 Season A, farmers ultimately were not willing to sell maize to their cooperatives for onward sale to AIFL, when the prices were not attractive relative to market prices. Cooperatives have also struggled to track outstanding loans and solicit repayments from farmers.
- Post-harvest logistics remains a key challenge. Farmers have indicated that meeting AIFL's quality standards is difficult, with most farmers still relying on manual labor for threshing and cleaning grain. AIFL may need to pay a premium above local market prices that are paid for lower quality maize, in order to procure the higher-quality maize and soybean needed for FBF production.

Following the results of this season, CHAI is undertaking a full review of our agriculture strategy. In conjunction with this review, CHAI plans to work with one or two cooperatives during the Season A 2017 harvest and post-harvest period, with the goal of demonstrating that AIF sourcing can work through cooperatives. Through this pilot, CHAI and a partner company will establish post-harvest processing centers co-located with partner cooperatives to rapidly process grain. The centers will be equipped with cash in order to purchase maize on AIF's behalf, and will have transport available to ship maize to AIF. The goal is to rapidly move maize from the farm to the factory, reducing quality losses and allowing farmers to capture greater value from their maize crop. Along with covering a portion of AIF's sourcing needs for 2017, CHAI's goal is to establish a proof-of-concept that sourcing can work through cooperatives. The model can then be scaled up to more cooperatives in future seasons.

s9(2)(b)(ii)

In Ethiopia, the delay in the establishment of the joint venture has limited the work that CHAI can do in linking farmers with a reliable market and setting up an affordable loan facility. However, CHAI anticipates that the legwork being done in Ethiopia now will allow for more effective procurement of maize and soybean when AIF starts operations.

Output 3: Supply chain for getting complementary food product from factory to homes is efficient and effective

Indicator	Target in 2016	Achieved by December 2016	Proposed 2017 Target
Indicator 3.1 Percent of designated distribution points distributing FBF (nationally in Rwanda; within target areas in Ethiopia)			
	Designated distribution points identified - Rwanda	Designated distribution points (health centers) identified in Rwanda	80% - Rwanda
	Supply chain proposal prepared - Ethiopia		Designated distribution points identified - Ethiopia
Indicator 3.2 Percent of distribution sites with stock-outs in the last 3 months			
	Standard operating procedures for stock management defined - Rwanda	Standard operating procedures for stock management defined in Rwanda	<10% Rwanda
			Standard operating procedures for stock management defined - Ethiopia
Indicator 3.3 Volume of product loss in supply chain			
	Staff training modules developed - Rwanda	Staff training modules developed in Rwanda	<10% Rwanda
			Staff training modules developed - Ethiopia
Indicator 3.4 % of product diverted			
	N/A	N/A	In-depth report produced on diversion using 3 sources of data, and targets agreed for 2018 - Rwanda

Progress towards output

In Rwanda, CHAI worked closely with the Ministry of Health and in particular the Medical Procurement and Production Division (MPPD) to plan for FBF distribution across the country. CHAI seconded a staff member to the task team working on FBF distribution, based out of MPPD, and also brought in Miles Vartan Consultancy Ltd. (MVC) to provide technical support. CHAI built on previous analyses of distribution plans to work through proposed routing for existing vehicles and options for sourcing additional vehicles in order to ensure that the health sector supply chain has sufficient transportation capacity for FBF. CHAI ran a number of budget scenarios that were then discussed with the Ministry of Health, and ultimately negotiated between the Ministry of Health and the Ministry of Finance, to ensure that the distribution plans are fully funded. CHAI supported the Government of Rwanda's beneficiary enrollment process, updating the quantification of eligible women and children for receipt of free FBF. Finally, CHAI worked with the MPPD to develop standard operating procedures for distribution and

stock management; electronic and paper-based monitoring systems; and training modules for staff to prepare the system for FBF distribution.

Development of FBF Distribution Plans

Early in 2016, CHAI developed a quantification model to project the number of 6-23 month olds and PLW within s9(2)(ba) requiring FBF at the health post, health center, and district pharmacy levels. The model used national population data to estimate the proportion of s9(2)(ba) households that would have 6-23 month olds or PLW, and then overlaid a listing of s9(2)(ba) households by village on the national listing of village assignments to health facilities. This analysis showed that out of 14,487 villages with s9(2)(ba) households, 14,367 (>99%) are within a two-hour walk of their assigned health facility. A follow-up analysis of the percentage of households within a two-hour walk of a health center (rather than a health post) is still underway. However, the analysis helped the Ministry of Health to determine that the country's network of 499 health centers should serve as the primary distribution points for FBF. Health centers will distribute FBF onward to health posts in their catchment areas as needed.

CHAI used the quantification model to produce indicative volumes by district and by health center for transportation planning. These figures were circulated to District Pharmacy managers, who used the data to review the feasibility of transporting FBF using space in the District Pharmacies' existing fleet of vehicles. The MPPD organized a workshop in mid-2016 to put together potential distribution routes. The MVC team provided heavy support for the workshop planning and reviewed the routes to optimize the use of the vehicles. The analysis indicated that most districts would be able to manage FBF distribution with existing vehicles, but that some supplementation would be needed with additional shared vehicles to fully meet the requirements.

Agreement on Distribution Funding

At the request of the Ministry of Health, CHAI and MVC ran a number of scenarios to show options for handling FBF distribution with the approximate cost of each option. The Ministry of Health opted to use the District Pharmacy vehicles to the extent possible, supplementing with additional rented vehicles. The analysis was very helpful in moving forward discussions on funding coverage between the Ministry of Health and the Ministry of Finance. The Ministry of Health was able to secure the budget to fund the operational costs of the District Pharmacy vehicles to distribute FBF. In addition, the Government of Rwanda negotiated with the WFP Country Office to secure the use of three additional vehicles from WFP. With the use of these additional vehicles, the FBF distribution costs are fully covered for the current budget year (2016-17). The Ministry of Health plans to analyze the actual running costs during the initial months of implementation, and use these figures to inform financial planning for the 2017-18 budget year.

Beneficiary Enrollment

From September to November 2016, CHAI provided support for the enrollment of eligible beneficiaries onto a list that will be used for FBF distribution. The Ministry of Local Government oversaw this process, because they are responsible for the s9(2)(ba) system that underpins the selection of

eligible beneficiaries. The Ministry of Local Government asked local officials to identify eligible households, i.e. those falling into s9(2)(ba) with children that would be 6-23 months of age at the start date of the program, and PLW eligible at the time of the launch. These lists were then compiled through local government, up to a compilation at the district level. CHAI and MVC provided support for the data cleaning and consolidation process, putting the enrollment information into a common format and flagging questions where information was missing or unclear. The information was then sent back out to local government for verification. The updated enrollment data were incorporated into a final listing that informed the product volumes that the Ministry of Health ordered from AIF for initial distribution.

The beneficiary enrollment process resulted in significantly fewer eligible beneficiaries than originally expected in the population-based model. The number of children 6-23 months of age was about 65% of original projections, with about 43,000 children identified, while the number of PLW was about 40% of the original projections, with about 20,000 PLW identified. In total, there are about 63,000 beneficiaries in s9(2)(ba) It appears that s9(2)(ba) households have fewer pregnant women and young children than expected based on the national population data. This may be because s9(2)(ba) households often meet the requirements for s9(2)(ba) because they do not have working-age adults, so they may be households consisting of the elderly or disabled, who may also be less likely to have young children. It is possible that the numbers will rise as the distribution begins and additional households claim eligibility. Buffer stock is being built into the initial orders to account for this possibility.

Even at the higher FBF prices than expected, the volumes required to cover the number of eligible beneficiaries in s9(2)(ba) do not bring the Ministry of Health to their s9(2)(b)(ii)
The Ministry of Health still has additional funding after fully covering s9(2)(ba) As a result, the Ministry of Health has decided to cover part of the next tier s9(2)(b)(ii)
s9(2)(ba) children 6-23 months of age (not PLW) will receive free FBF in the ten districts of the country with the highest stunting rates – one third of the total 30 districts in Rwanda. The number of children covered in s9(2)(ba) is likely to be around 50,000, bringing the total number of program beneficiaries to 113,000. The enrollment process for s9(2)(ba) will begin in January 2017, and distribution to s9(2)(ba) is likely to begin by the second quarter of 2017.

Preparation for Product Distribution

Having reached an initial agreement on the distribution model, funding, and beneficiary figures, CHAI and MVC worked with MPPD during the last quarter of 2017 to make the necessary logistical preparations for FBF distribution. This included detailed analysis of actual ordered FBF volumes per health center against the predictions used during the routing workshop to ensure distribution models and routes for each district were still feasible, adjustments being made when this was no longer the case. Following the addition of three WFP vehicles to assist with FBF distribution, MVC worked with MPPD to analyze which districts should receive priority support from WFP, taking into consideration their distance from Kigali, their reported current vehicle use and the total volume of FBF ordered for their distract. A new launch distribution plan was drafted to reflect this.

CHAI worked closely with the appropriate counterpart agencies to put in place clear standard operating procedures and monitoring tools for FBF supply chain management. CHAI reviewed the existing tools in

use for supply chain management in the health sector, building on available tools where possible and creating new ones as needed. CHAI worked with the MPPD to make adaptations to the electronic Logistics Management System (eLMIS) to incorporate FBF orders and stock management, and made sure that paper-based forms were available to align with the electronic system in the event that the electronic system was inaccessible. The MVC team worked with MPPD to develop standard operating procedures (SOP's) for each step of the FBF supply chain management process, during which the operational steps were discussed in detail. These forms and SOP's were used to develop training seminars and decentralized presentations and training sessions for staff at each level of the health system, including District Pharmacy directors and store managers, and data managers and nutritionists from each health center. These trainings were rolled out in November and December 2016. CHAI also helped to recruit key staff members for an FBF coordination office that will be located on-site at AIF to assist with monthly ordering, planning, order quantification and stock control at the health center level.

With the funding agreed and vehicle capacity confirmed from WFP, the MVC team provided intensive support to MPPD at the end of the year to map out the exact collection schedule and routing, combining the District Pharmacy vehicle routes with the three WFP vehicles. This effort resulted in a detailed schedule for the initial product distribution based on a confirmed FBF handover date at AIF. As of the writing of this report in January 2017, the product has been approved and distribution has started.

Challenges and lessons learned

Lack of data available at the national level regarding the roads and road conditions between District Pharmacies and Health Centers caused significant planning and budgeting challenges in Rwanda. These challenges were overcome primarily by hosting the route planning workshop to engage with representatives from each district who have good knowledge of their road systems. This area knowledge was recorded and utilized during the initial stages of planning and budgeting. Optimizing the routes to each district using government vehicles posed an additional challenge because the use required for the FBF distribution in some districts exceeded the reported vehicle availability. This was overcome by recommending additional support via contract (now WFP) vehicles in these areas in order to minimize disruption to the existing government pharmaceutical supply chain.

The beneficiary enrollment process proved time-consuming in Rwanda, with multiple rounds of data collection, compilation, and refinement needed to identify eligible beneficiaries. While the participating local officials were informed as to the purpose of the enrollment exercise, more sensitization in advance of the enrollment process would have helped to reduce confusion and resulting errors in the lists of beneficiaries. There is likely to be some continuing fluctuation in the numbers of eligible beneficiaries, even beyond what would be expected from new beneficiaries entering the program due to a new pregnancy or reaching the appropriate age. An appeals process has been put in place to resolve any disputes as to eligibility. CHAI recommended that the Ministry of Health bring on district focal points to help oversee this process and resolve challenges. (See more information in following section.)

In Ethiopia, further work on supply chain planning was not carried out s9(2)(b)(ii)

Output 4: Demand, uptake and consumption of complementary food product by the poor is optimal

Indicator	Target in 2016	Achieved by December 2016	Proposed 2017 Target
Indicator 4.1 Percent of caretakers reporting accurate understanding of serving size, number of portions per day, storage, preparation etc.			
	Action plan for education campaign developed - Rwanda	Action plan for education campaign developed in Rwanda	60% Rwanda
			Action plan for education campaign developed - Ethiopia
Indicator 4.2 Percent of health workers demonstrating understanding of key promotional messages (passing post-training assessments)			
	Training materials for health workers prepared - Rwanda	Training materials for health workers prepared and distributed in Rwanda	70% Rwanda
			Key messaging document prepared - Ethiopia
Indicator 4.3 Percent of poorest pregnant and lactating women (PLW) reporting consumption of FBF in the last 24 hours			
	Formulation for PLW product in Rwanda finalized	Formulation for PLW product in Rwanda finalized	60% Rwanda
			PLW product plans finalized - Ethiopia
Indicator 4.4 Average quantities of FBF reported as consumed by PLW in the poorest families			
	N/A	N/A	50g/day Rwanda
Indicator 4.5 Percent of households reporting receiving product at the correct price (free for eligible households in Rwanda)			
	N/A	N/A	80% Rwanda

Progress towards output

In Rwanda, CHAI worked closely with the task team assigned to communications to develop promotional materials and training materials to ensure that health workers as well as beneficiaries have accurate information about FBF. CHAI also worked with the quality task team to identify and order critical supplies to facilitate appropriate use of FBF at the household level, including measuring scoops and tin ties to close the FBF bags. At the request of the Minister of Health, CHAI agreed to support dedicated FBF focal points to be placed in each of Rwanda's 30 districts. The focal points will play a coordination and oversight role in FBF distribution, enrollment, and the awareness campaign.

Finalization of Product Specifications

In Rwanda, CHAI provided support to the Ministry of Health (MoH) to finalize the specifications for both the children's product and the PLW product. The product for PLW is adapted from Super Cereal, containing maize and soybean, but not sugar or skim milk powder. The FBF for PLW will be distributed to provide 100 grams per woman per day, or about 380 kilocalories per day, intended to provide a significant contribution towards the increased energy requirements of pregnancy and breastfeeding. The FBF for PLW contains a full suite of vitamins and minerals, which is aligned with the added

micronutrient values of the FBF for infants and young children, and also provides a significant portion of the mother's daily requirements. CHAI solicited review and refinement of the specifications for the PLW product from specialists at WFP and DSM, and continued to liaise with specialists for guidance as the MoH had questions on the proposed specifications.

Development of Communication Materials

CHAI worked closely with the Ministry of Health and the Rwanda Health Communications Center in the second half of 2016 to develop communications materials for FBF. The team agreed on a core set of messages to be incorporated into all of the materials, including hygienic preparation and storage of FBF; accurate serving sizes for children at each age group and for PLW; and the importance of exclusive breastfeeding through six months and continued breastfeeding through two years. These messages were incorporated into a job aid for health workers, and subsequently adapted into training materials and job aids for nurses, community health workers, local government officials, and beneficiaries themselves. An example of these materials, a single-page information sheet for beneficiaries, is attached as an annex to this report. The materials were reviewed in the Nutrition Technical Working Group, and partners in Rwanda led by WHO agreed to fund the production of the materials.

The development of the communication materials represented the first step in the broader action plan for FBF communications. Training on FBF distribution, storage and appropriate use was rolled out to staff at each level of the health system during the last quarter of 2016. CHAI and partners will continue to implement the action plan in the first quarter of 2017 with communication directly to beneficiaries. This will include a mass media campaign, using radio spots to promote FBF, and communications from local government officials and community health workers about FBF. The community health workers will be on the front lines of the communications campaign in sharing information with caregivers about appropriate preparation and use of FBF.

With CHAI support, the Ministry of Health ran trainings at the end of 2016 to ensure that health workers across the country were prepared to manage FBF distribution and education to beneficiaries. Health workers were trained on the package of communications tools. Community Health Workers were given a specific checklist of items to observe and discuss with beneficiary households, including checking on hygienic FBF preparation and storage, breastfeeding practices, and FBF sharing practices. The Community Health Workers have also been tasked with giving particular attention to any illness among the beneficiaries, particularly the 6-23 month olds. This is both to be alert to any potential adverse effects of the FBF itself, and to ensure that children are referred and treated for other common illnesses that could impact the child's appetite and/or nutrient absorption.

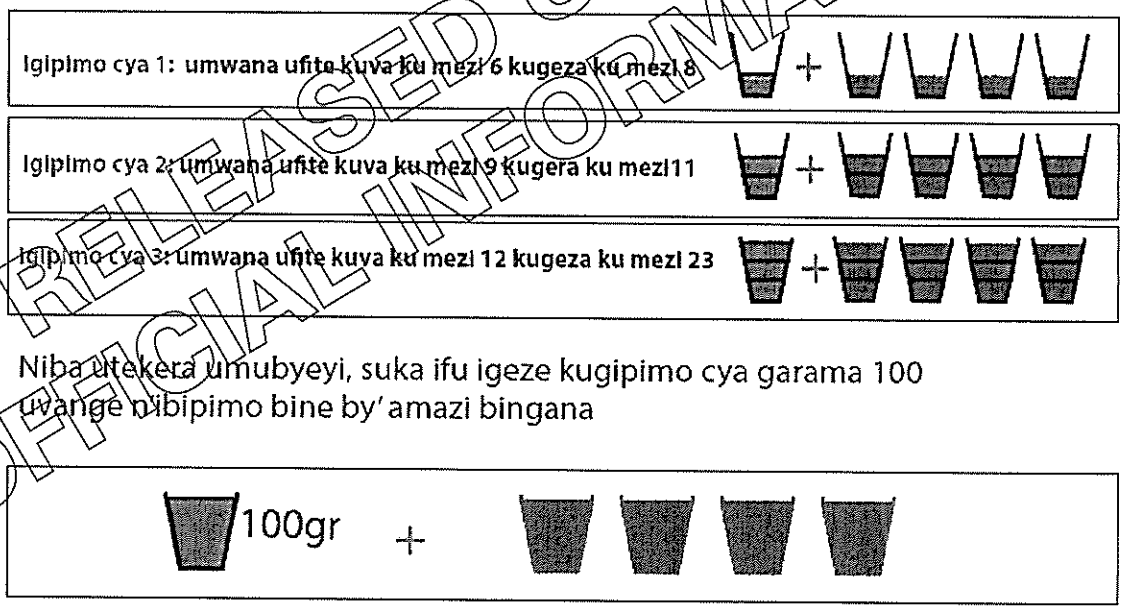
Selection of FBF Supplies

In order to help households use the FBF as recommended – with the appropriate serving sizes, and with minimal risk of contamination – CHAI worked with the quality task team to identify and source household supplies to accompany FBF. First, CHAI reviewed a number of potential options to safely store FBF flour in the household. While the FBF bags are durable and well-sealed, there is a risk of contamination once the bag is opened, particularly with the use of the same bag for up to a month for

the youngest children (6-8 months of age). CHAI looked at plastic containers, clips, and metallic "tin ties" to enclose or reseal the bags. Ultimately the "tin tie" solution was selected as providing the best reseal at a reasonable cost. Like the bars on the top of coffee bags, the tin ties can be affixed to the top of the FBF bag, and then bent around the sides of the bag when the FBF bag is folded down after use. CHAI identified suppliers and procured samples of a number of tin ties, agreeing on a supplier in partnership with the Ministry of Health.

Secondly, CHAI looked at options for measuring the appropriate quantities of the FBF flour for preparation of porridge, including measuring cups and measuring spoons. A small measuring cup was determined to be preferable to a scoop that would be reinserted into the FBF bag and potentially introduce contamination. CHAI worked with the Ministry of Health to develop a prototype for the measuring cup, which is custom ordered to show lines matching the quantities recommended for each age group. CHAI procured samples of the measuring cups and made sure they suited the project's requirements. CHAI placed initial orders for both measuring cups and tin ties in December, and the supplies are on track to arrive in time for distribution to health centers in January.

Figure 4: Visual aid to using the measuring cups, extracted from FBF job aid



Recruitment of District Focal Points

In discussions with the Minister of Health, CHAI suggested that dedicated district focal points could be considered to help organize the initial stages of the FBF program. The Minister of Health agreed that this would be a key role, and asked that CHAI support and fund these positions to coordinate the FBF program within Rwanda's 30 districts. CHAI has seen programs utilize district focal points in the early stages of other public health programs, such as the roll-out of antiretroviral treatment, with considerable success, and believes this will be an important contribution to the success of the nutrition

program in Rwanda. The focal points will act as an information network for the Ministry of Health to ensure the success of the program. The focal points will be responsible for coordinating between agencies to make sure that beneficiary enrollment, distribution, and the communication campaign are smoothly executed. The focal points will perform a monitoring and troubleshooting role, identifying problems and helping to resolve them. After agreeing with the Ministry of Health on terms of reference for the focal points, CHAI recruited the 30 focal points and began their training in December 2016. The focal points will finish their training in January 2017 and be in place for FBF roll-out. The focal point roles will be time-limited, phasing out once the program is off the ground.

Supporting Product Development in Ethiopia

CHAI carried out a market survey in 2015 to understand current feeding habits in rural and urban areas of Ethiopia, and the perceptions towards fortified foods – specifically those targeting pregnant and breastfeeding women, and infants and young children. The data were then compiled and analyzed in early 2016. The results of this assessment show that:

- The most commonly consumed traditional food, in both urban and rural areas, is injera with wot (sauce). In addition to injera, urban families also consume pasta and macaroni. Rural families mostly consumed food grown in their farms, with limited purchase of additional ingredients, while urban families purchased all their foods from retail outlets. Finances for food purchases were mostly provided by the men who were also occasionally involved in deciding the types of food to be bought.
- Pregnant women typically ate from the family pot, sometimes with the addition of extra snacks such as juices and milk. Lactating mothers also ate from the family pot; however, during the first few weeks/months after giving birth, their diet was enhanced and supplemented with either porridge, gruel or animal products such as meat.
- Infants and young children usually ate separately from the rest of the family. The types of foods given to infants and the time of introduction varied by family and region. The field visits found that most of the foods given to infants and young children lacked diversity and were generally not given in the amounts recommended by national feeding guidelines. This was because mothers either did not know the feeding recommendations, or they did not have money to buy the appropriate foods for their children. Early introduction and delays in the introduction of complementary foods were also common.
- Rural respondents were not familiar with processed food products that specifically targeted pregnant or lactating women. In Addis Ababa, there was more familiarity with a few packaged baby food products that are locally manufactured.
- Most of the respondents were receptive to using processed foods, especially for infants, as they were believed to be tasty, easy to prepare and nutritious. However, these foods were commonly seen as supplements to traditional foods, rather than stand-alone meals.
- The respondents were receptive to using foods specifically designed for pregnant women and young children as long as these foods were enriched with nutrients for the growth and

development of children and for the good health of mothers. Most of them preferred a porridge mix for both the mothers and children, and they also preferred the product to be made available in multiple sizes, so that they could buy the size that they could afford. Urban families were concerned about product safety and will need to be reassured that there were regulations observed with regards to the storage, and safe handling of such products. All of the respondents were concerned with product affordability.

Technical and Financial Support for the Ministry of Health

In Ethiopia, CHAI continued to support the National Breastfeeding Week and related programs with financial support and technical support via the relevant Technical Committees and Task Forces. CHAI continued to participate in the monthly Nutrition Development Partners Forum, contributing to the discussion and development of policy briefs on topics such as infant and young child nutrition, maternal nutrition, the Breastmilk Substitute Code, the Productive Safety Net Program and nutrition, nutrition in emergencies, etc. Specifically during this reporting period, CHAI supported the Forum on the development of questionnaires for dietary recall. CHAI participated and contributed in other relevant national initiatives such as the Reproductive, Maternal, Neonatal and Child Health – Nutrition cluster meeting at the Ministry of Health and the Sekota Declaration strategic planning workshops. CHAI also attended the National Food Fortification Steering Committee meetings, and participated and contributed in the National Food and Nutrition Policy black writings.

Challenges and lessons learned

CHAI and the Ministry of Health of Rwanda will be closely monitoring product roll-out in Rwanda, in order to identify and address challenges as they come up, and track the process of program implementation. CHAI will be conducting focus groups starting 4-6 weeks after product launch to begin identifying challenges, including looking at how the product is used and potentially shared in the household, and whether the supplies provided (measuring cups and tin ties) are reaching households and being used appropriately. The district focal points will also be responsible for program monitoring, including meeting with beneficiaries directly and meeting with Community Health Workers to track the challenges encountered with the FBF program and effective solutions. This should lead to rapid identification of challenges and development of solutions in 2017.

Output 5: Evidence is generated on the effectiveness of the complementary food product to inform replication of the approach in other contexts

Indicator	Target in 2016	Achieved by December 2016	Target by 2017
Indicator 5.1 Monitoring report on JV formation, with documentation of process and lessons learned			
	Monitoring reports on Rwanda and Ethiopia JV formation	Reports on Rwanda and Ethiopia JV formation completed	Updated monitoring report on JV formation in Ethiopia
Indicator 5.2 Monitoring report on agricultural support and procurement model, with documentation of process and lessons learned			
	Monitoring report on agriculture in Rwanda	Monitoring report on agriculture in Rwanda completed	Monitoring report on agriculture in Ethiopia
Indicator 5.3 Monitoring report on product distribution with documentation of process and lessons learned			
	N/A	N/A	Monitoring report on distribution in Rwanda
Indicator 5.4 Monitoring report on product uptake with documentation of process and lessons learned			
	N/A	N/A	Monitoring report on uptake in Rwanda
Indicator 5.5 Impact evaluations completed			
	Rwanda impact evaluation design reviewed and updated	Rwanda impact evaluation design reviewed and updated	Data collection undertaken in Rwanda
			Evaluation design drafted in Ethiopia

Progress towards output

Rwanda Cohort Study Nearing Completion

CHAI has nearly completed data collection on the baseline cohort of children tracked since 2014. Between September 2016 and January 2017, one round of household visits was completed, representing Round 9 of the data collection. The last and final round will begin at the end of January 2017. CHAI completed data quality assessments on a weekly basis, and all data collectors were audited on four interviews each per round. CHAI reconciled data through an operational analysis after each round of data collection, measuring the quality of data using Lot Quality Assurance Sampling (LQAS). Study managers provided the data collectors with feedback from the data quality reviews and operational analyses during workshops and ongoing trainings. A baseline report summarizing the data collected through Round 8 was prepared and shared with the Ministry of Health. At the conclusion of data collection the report will be finalized to incorporate data collected from Rounds 1 through 10. Further, a final dataset will be shared with the Ministry of Health.

Rwanda Study Design Updated

The FBF distribution plans have changed considerably since CHAI originally designed the cohort study in 2014. The original design assumed that households across multiple Ubudehe levels would have access to FBF, with a range of consumption levels, allowing observational measurements of FBF consumption. The design would then measure impact between high- and low-uptake groups of children. Due to unexpected external factors, roll-out of a subsidized FBF product to the middle tiers of the Ubudehe system will be limited. This implies that, at least at the initial roll-out, there will be high uptake of FBF within Ubudehe 1; high uptake in Ubudehe 2 only in the 10 districts identified for free FBF; and uncertain uptake among Ubudehe 3. This creates difficulties for the comparability of the high- and low-uptake groups. In light of these changes the study design was modified. To assist with these efforts CHAI started a contract with the London School of Hygiene and Tropical Medicine (LSHTM) to serve as advisors and provide technical support on the impact evaluation of the program. As an independent group, LSHTM can strengthen the rigor of the evaluation by providing an unbiased perspective. A technical meeting was held in London in October 2016 to review the program evaluation plans. During this meeting, CHAI and LSHTM constructed a robust evaluation plan and drafted a protocol. The protocol was submitted to the first of three rounds of local ethical approval, and was approved by CHAI's Scientific and Ethics Review Committee.

The impact evaluation design going forward is a quasi-experimental study, using repeat cross-sectional surveys in randomly selected villages, to assess the effectiveness of the FBF provision to s9(2)(ba) children, pregnant women, and lactating women in Rwanda. We will compare the change in height-for-age z-score as well as proportion stunted (HAZ, <-2 SD) of s9(2)(ba) children, 18-23 months of age, *before* and *after* the introduction of FBF in Rwanda. In the 20 districts of the country where s9(2)(ba) children will not receive free FBF, the evaluation will also include a concurrent comparison of the s9(2)(ba) children to the s9(2)(ba) children residing in the same villages, as a quasi-control. An additional comparison will be done between the s9(2)(ba) children in the ten districts where s9(2)(ba) children will receive free FBF, and the s9(2)(ba) children in remaining 20 districts of the country.

In addition to a structured interview assessing information on FBF provision, anthropometric measurements will be obtained and a blood sample will be collected to assess micronutrient status among s9(2)(ba) children at baseline, midline, and endline surveys. The blood sample will be used to assess haemoglobin for anemia; ferritin and serum transferrin receptor (STfr) for iron-deficiency anemia; retinol binding protein (RBP) for vitamin A deficiency; and c-reactive protein (CRP) and A1-acid-glycoprotein (AGP) for acute and chronic inflammation. Additionally, we will conduct cross-sectional interim coverage surveys and a process evaluation to determine the (i) distribution, access, and consumption patterns of the children, pregnant women, and lactating women for complementary and supplementary feeding; and (ii) knowledge, attitudes, and practices on the preparation, consumption, and storage of the FBF products.

Monitoring Systems Developed in Rwanda

CHAI worked closely with the M&E task team for the FBF project to develop indicators for the program and ensure that these were integrated into the health and logistics monitoring systems. For health indicators, the team agreed to fold FBF indicators into the national Health Management Information System (HMIS), which is in use at all of the health centers and allows data to be collected and tracked at the national level. As a back-up, in case the HMIS system is down, CHAI also worked with the task team to develop a paper-based register that can also be used at each site. The key indicators that will be tracked include the FBF volumes picked up by a household each month, and the child's height (on a quarterly basis) and weight (on a monthly basis). As discussed above, FBF distribution will be tracked via the national eLMIS with paper-based forms available as back-up.

Preparation for M&E in Ethiopia

CHAI continued several activities during 2016 to prepare for monitoring and evaluating the nutrition program in Ethiopia. CHAI developed a set of tools to identify strengths and gaps in nutrition indicators tracked via the national Health Management Information System (HMIS), with the goal of collaborating with the Ministry of Health to implement any targeted improvements that may be needed within the HMIS to monitor stunting. CHAI has also been following the development of the National Information Platform for Nutrition, an initiative of the European Commission, as well as the Unified Nutrition Information System for Ethiopia, which is being funded by DFID and devised by the Nutrition Development Partners Forum. Both of these platforms are envisaged to benefit the entire nutrition community and help monitor progress on key indicators in Ethiopia. CHAI has also put together an initial short-list of academic institutes in the country that could serve as partners on the impact evaluation of the program.

Challenges and lessons learned

Changes to the FBF distribution plans in Rwanda have made it more difficult to plan for the evaluation, although ultimately the changes made at the end of 2017 to include some s9(2)(ba) households should enhance the program's impact by covering more beneficiaries. Uncertainty around distribution plans and timing in Ethiopia continues to make it difficult to plan for the impact evaluation in Ethiopia.

The CHAI team has learned a great deal from implementing the cohort study in Rwanda, which will make it easier to implement the study going forward (in Rwanda as well as in other countries). The major challenge going forward will be incorporating the micronutrient testing, which has increased logistical requirements relative to the surveys and anthropometric measurements.

D. Value for Money

CHAI places a high value on frugality, seeking to maximize impact while minimizing spending across our programs. CHAI teams continually evaluate operational decisions to ensure that our objectives are being met while exercising responsible stewardship of donor funds. CHAI always looks for the most cost-effective ways of reaching our goals.

At a policy level, CHAI has the following measures in place to keep costs low:

- Maintaining a lean management team with small back-office teams, both in-country and at the headquarters level, keeping salaries and policies in line with budget constraints. CHAI salary structures are in line with civil society and the public sector.
- Instituting policies that emphasize low-cost alternatives to typical operating expenses, for example: procuring items using a tender process that identifies the most competitive prices and after sale service available, using economy class airfare for all staff, asking staff to make travel arrangements in advance to take advantage of low prices and fares, negotiating favorable hotel rates, and using skype for long distance calls. CHAI's target rates for travel and other non-salary expenditure meet or fall well below recommended maximum rates suggested by normative bodies such as the World Bank.
- Using internal resources as much as possible to minimize duplication of efforts and the associated costs. This can take the form of utilizing internal research material to inform new program work, and positioning staff to provide support across diverse program functions where possible.

CHAI maintains a very low indirect cost rate compared to our peers. Indirect costs are costs incurred for many common and joint objectives across our organization and cannot be readily identified or tracked to a single activity or project. Supporting functions included within this group of activities include the functions of Accounting, Administration, Budgeting, Donor Reporting, Human Resources, IT Support, Internal Audit, Global Payroll, and Global Management. The vast majority of indirect costs are driven by our flat organizational model and related to personnel at headquarters in these support functions. Most importantly, these support functions allow CHAI to maintain an adequate infrastructure to efficiently manage multiple projects across various continents. This infrastructure ensures CHAI can meet its programmatic objectives while remaining fiscally responsible with all donor funds.

Within the nutrition program in Rwanda and Ethiopia, CHAI's approach to assuring value for money has remained consistent with its guiding principles. CHAI has kept a small team coordinating the nutrition program across countries, with half of the team based in the region to reduce travel costs. Our in-country teams are leanly staffed, with the teams growing only as needed to address program demands. National and international travel is consolidated as much as possible, with trips being leveraged to serve multiple purposes. CHAI has also made cost-saving decisions with regard to specific programmatic objectives, such as conducting the Rwanda evaluations in-house rather than outsourcing to a firm that would undertake the same work at greater cost. As CHAI has been identifying suppliers for key programmatic supplies in Rwanda, we have solicited multiple quotes and obtained product samples to identify the lowest- cost options that meet quality requirements.

Besides focusing on economic value, CHAI has also placed focus on overall program effectiveness as a way of enhancing the overall project's value for money. With this in mind, CHAI is using a phased approach of implementing the agricultural and nutrition work, starting with implementation in Rwanda and Ethiopia, before expanding to the other target countries. This approach allows both CHAI and our donors to assess progress and refine the program model as needed before moving forward in new settings. For instance, CHAI scaled down the agriculture program footprint and spending in Rwanda in light of the results of the past two seasons, and will limit spending during the period of the current strategic review. CHAI has been carefully monitoring the quality of data collected in Rwanda and Ethiopia in preparation for program launch, and has plans in place to track progress after FBF launch in Rwanda. This allows CHAI to gauge the effectiveness of our activities, course correct as needed, and ultimately put more resources towards approaches that are working.

The efficiency of FBF production continues to be a key priority for both CHAI and AIF. Measures to bring down the cost of production will help to ensure the competitiveness of SuperCereal Plus s9(2)(b)(ii) Lower cost production will also allow governments to purchase additional product volumes, thereby increasing product access. In order to reduce product cost, AIF is setting up the production facilities and management teams as efficiently as possible while still meeting rigorous quality standards.

The project's strongest value for money may come from the project's ability to leverage additional funding sources to make the entire model work. AIF plans to invest in at least two factories in Rwanda and Ethiopia for a total investment of approximately s9(2)(b)(ii) million. The Government of Rwanda is purchasing s9(2)(b)(ii) of FBF per year for five years, and the Government of Ethiopia is expected to purchase a similar amount. The WFP has committed to purchase s9(2)(b)(ii) per year for five years from the Rwandan factory, a value of over s9(2)(b)(ii). The IFC has put in place a s9(2)(b)(ii) credit line for Rwanda farmers. The donor funding for CHAI's role has thus been highly catalytic and effective in mobilizing complementary resources for the project.

E. Risk Management

The nutrition initiative continues to represent an ambitious, high-risk project for CHAI. Internally, the program has a well-coordinated management team operating within and outside of the program countries that works to identify and mitigate the greatest risks. This process is managed through weekly calls supplemented by in-person meetings at least once a quarter. Externally, CHAI has facilitated the formation of review processes and advisory teams for each of the key work streams. For instance, risks in the agriculture work stream have been managed through the partners that form the procurement planning group, and the Rwanda studies are being managed with support from international and national advisory groups. These teams have been invaluable in troubleshooting and finding solutions when challenges have arisen over the past year.

A key risk to the project continues to be the financial viability of the local joint ventures. In Rwanda, major changes in the competitive landscape for SuperCereal Plus production in Europe pushed out the factory's profitability, resulting in the need for a cash call among the investors. In response, the AIF Board, on which CHAI has observer status, made changes to reduce cost and accelerate plans for rapid entry into the commercial markets in the region. In the long run, CHAI believes that the adaptations made in response to these challenges in 2016 will make the joint ventures more sustainable, by pushing the Rwanda venture into commercial markets more quickly and focusing the Ethiopia venture on commercial success from the early stages of factory design.

The agriculture component to the project has continued to pose risks, s9(2)(b)(ii)

These challenges have contributed to the difficulties for AIF's business case in Rwanda, with a significantly higher cost of maize and soybean than expected. The review team put in place during 2014 has continued to function as a mediator of the challenges in the agriculture work stream, with some success during 2016. However, finding more robust ways to manage risk and improve outcomes for both farmers and for AIF will be a major focus of CHAI's efforts in 2017. The preparatory work being done in Ethiopia on the agriculture work stream should also position the program for more successful procurement once AIF begins production.

With product launch approaching, in the last quarter of 2016 CHAI took a systematic approach to identifying key risks around the launch and putting in place a work plan in collaboration with the Ministry of Health to make product roll-out as smooth as possible. The work plan shows a coordinated view of launch requirements across work streams, showing where there are contingencies between key steps. Based on the latest timelines for each of these steps, the work plan indicates the earliest feasible dates for the beginning of FBF distribution, and for product launch to beneficiaries. This has been a helpful tool for planning and has helped ensure a coordinated approach to the launch.

Finally, CHAI has been seeking to manage risks around the program evaluation planned in Rwanda. With distribution plans shifting in the last few months of the year, the finalization of the study protocol was delayed, pushing back timelines for the submission of the protocol for ethical approvals. CHAI is working to get the protocol approved as quickly as possible so that an updated baseline can be collected, in line with the updated evaluation plan, in parallel with product launch and before FBF has

been widely consumed. CHAI has put in place an Evaluation Advisory Group that has held a first meeting and that will help to guide the study, troubleshooting challenges as they arise. CHAI has submitted the protocol with micronutrient testing included, which if approved, will allow for an alternative outcome measure, allowing the study to examine whether FBF improves micronutrient status as well as anthropometric outcomes.

Health and Safety

s6(a)

In August 2016 an outbreak of Acute Watery Disease affected inhabitants of some parts of Addis Ababa and areas surrounding the city.

In all of these situations, CHAI's Safety and Security (S&S) team has been closely following the unfolding developments in order to make informed decisions and advise staff appropriately to ensure the team's safety. To this end, the S&S team has continued to make regular situational analyses, visit regions, collect reliable data from staff on the ground, and coordinate with other NGO partners and governmental organizations.

With this careful monitoring and risk mitigation, the CHAI team in Ethiopia did not experience any health or safety incidents during 2016. s6(a)

In Rwanda, the team was impacted by one safety incident, a motorbike accident in late July 2016. A member of the agriculture team was en route to a partner cooperative when he collided with a bicycle entering the road. The incident was reported through CHAI's reporting protocols and the S&S team provided support. The team member was promptly treated for minor injuries (a fractured finger) at a local hospital and has made a full recovery. The incident was reported to the police, and the damage to the motorbike was covered by insurance.

F. Monitoring & Evaluation

New Nutrition Research Published in 2016

A number of new studies were published in 2016 examining the impact of various nutritional interventions on children's growth and nutritional status. The studies continue to show mixed results.

Adu-Afarwuah et al. found positive results in a randomized controlled trial of small quantity lipid-based nutrient supplements (SQ-LNS) provided to pregnant women, nursing women for six months post-partum, and children from six to 18 months of age in Ghana.[2] The study had two control groups: one in which pregnant women were given iron folic acid, and then nursing women were given a placebo; and a second in which pregnant and nursing women were given multiple micronutrient supplements. Compared to the control groups, the children in the SQ-LNS group showed better length, length-for-age z-scores, weight, and weight-for-age z-scores at 18 months of age, with significantly lower stunting rates. These results are a positive indication for the potential of supplementation for both women and children to improve growth. The authors postulate that SQ-LNS may have been more effective in improving growth outcomes in Ghana than in similar studies conducted in Malawi and Burkina Faso because of fewer underlying constraints on growth, such as the presence of subclinical infections and/or environmental enteropathy.

Zhang et al. assessed the impact of a complementary food supplement on stunting and anemia in a rural province of China.[3] The supplement, Ying Yang Bao, consists of multiple micronutrients plus full-fat soy flour contributing essential fatty acids and protein. The study compared an intervention county where Ying Yang Bao was provided for free to all children 6-23 months of age to a control county where no intervention was provided. Anemia rates declined in both counties over the study period, with total anemia and mild anemia declining significantly more in the intervention county than the control county. However, no differences were observed in the rate of stunting reduction between the two counties. The authors postulate that the supplements may not have provided sufficient calories and protein to reduce stunting, and that environmental enteropathy may have played a role. It is worth noting that the initial stunting rates observed in both counties were considerably lower than the stunting rates in CHAI's partner countries, at 9.9% in the intervention county and 17.8% in the control county at baseline.

Janmohamed et al. explored the impact of prenatal supplementation with Corn Soya Blend (CSB) Plus on birth outcomes and maternal weight gain among rural Cambodian women.[4] The women who received

[2] Adu-Afarwuah S, Lartey A, Okronipa H, Ashorn P, Dewey K et al. (2016) Small-quantity, lipid-based nutrient supplements provided to women during pregnancy and 6 mo postpartum and to their infants from 6 mo of age increase the mean attained length of 18-mo-olds children in semi-urban Ghana: a randomized controlled trial. Am J Clin Nutr 2016; 104: 797-808.

[3] Zhang Y, Wu Q, Wang W, et al. (2016) Effectiveness of complementary food supplements and dietary counselling on anaemia and stunting in children aged 6-23 months in poor areas of Qinghai Province, China: a controlled interventional study. BMJ Open 2016; 6:e011234. doi:10.1136/bmjopen-2016-011324.

[4] Janmohamed A et al. (2016) Prenatal supplementation with Corn Soya Blend Plus reduces the risk of maternal anemia in late gestation and lowers the rate of preterm birth but does not significantly improve maternal weight

the CSB Plus supplements had a lower risk of preterm birth and reduced rates of anemia at 36-38 weeks gestation, compared to a control group that did not receive any food supplements (both groups received iron folate, in line with the current standard of care). However, there were no significant differences in birth weight, small for gestational age, birth length, head circumference, or maternal weight gain between the groups. Trends within the data did indicate that women who were underweight in early pregnancy benefited more from the supplements than other women, with higher rates of maternal weight gain and increased birth weight. A higher rate of fetal loss was observed in the treatment group (10.2% compared with 3.7%; $p<0.01$), a result which the authors find difficult to explain, except to speculate that perhaps the supplements sustained pregnancies which would otherwise have been lost in the early weeks.

Two similar randomized controlled trials conducted in Nigeria and Uganda by a common study team investigated the effect of short-term supplementation with ready-to-use therapeutic food (RUTF) or micronutrients for children after illness for prevention of malnutrition[5,6]. The study looked at children 6-59 months of age who were diagnosed as having malaria, diarrhea, or lower respiratory tract infection. The children were assigned to one of the following groups for a period of 14 days after the illness: one sachet per day of RUTF; two sachets per day of micronutrients; or no supplement (control). The studies found different results in the two settings: nutritional supplementation with RUTF proved effective in preventing malnutrition in Uganda, while it did not reduce the incidence of malnutrition in the similar Nigeria study. Micronutrient supplements alone did not reduce the incidence of malnutrition in either setting.

Maternal and Child Nutrition published a supplement in May 2016 focused on preventing stunting in South Asia. While many of the research articles are specific to South Asia, the review articles include useful updated summaries of the current research base around stunting. Dewey points out that trials are showing that supplements for pregnant women have greatest impact on birth weight among undernourished women[7], which aligns with the Government of Rwanda's decision to provide FBF to pregnant and lactating women from Ubudehe 1. Dewey also flags the importance of clinical and subclinical infection in driving stunting rates. This theme is further explored in Mbuya and Humphrey's review of environmental enteric dysfunction, which proposes that enteric dysfunction is the primary pathway between an unclean environment and stunting, rather than diarrhea.[8] The authors propose a

gain and birth anthropometric measurements in rural Cambodian women: a randomized trial. Am J Clin Nutr. 2016 Feb;103(2):559-66. doi: 10.3945/ajcn.114.104034. Epub 2016 Jan 6.

[5] Van der Kam et al. (2016) Effect of Short-Term Supplementation with Ready-to-Use Therapeutic Food or micronutrients for Children after Illness for Prevention of Malnutrition: A Randomized Controlled Trial in Uganda. PLoS Med 13(2): e1001951. doi:10.1371/journal.pmed.1001951

[6] Van der Kam et al. (2016) Effect of Short-Term Supplementation with Ready-to-Use Therapeutic Food or micronutrients for Children after Illness for Prevention of Malnutrition: A Randomized Controlled Trial in Nigeria. PLoS Med 13 (2): e1001952. doi:10.1371/journal.pmed.1001952

[7] Dewey, K. (2016) Reducing stunting by improving maternal, infant and young child nutrition in regions such as South Asia: evidence, challenges and opportunities. Maternal and Child Nutrition: 12(Suppl. 1) pp. 27-38.

[8] Mbuya, M and Humphrey, J. (2016) Preventing environmental enteric dysfunction through improved water, sanitation and hygiene: an opportunity for stunting reduction in developing countries. Maternal and Child Nutrition: 12(Suppl. 1) pp. 106-120.

framework for "baby-WASH" interventions that specifically focus on interrupting the most common pathways for pathogen transmission in the first two years of a child's life. In addition to handwashing practices, use of clean toilets, and point-of-use water treatment, the authors include clean play spaces for infants and young children, and exclusive breastfeeding for the first six months, as key mechanisms to reduce infection and therefore the environmental enteric dysfunction that may result in stunting.

The World Food Program's Saskia de Pee and colleagues published a chapter in *Good Nutrition* in late 2016, titled "Providing Access to Nutrient-Rich Diets for Vulnerable Groups in Low- and Middle-Income Settings." The authors point out the difficulties in meeting the nutrient needs of older infants and young children using locally available foods, particularly when children's nutrient requirements are likely higher than the current RNI values, given that infections are common, their mothers may have nutrient deficiencies, and they may require catch-up growth from being born small for gestational age. The article publishes the SuperCereal Plus formulation designed for complementary feeding, which is aligned with the program's FBF formulation for children in Rwanda. The authors make the case for the use of specialized nutritious foods like SuperCereal Plus for prevention of undernutrition, and point out that fortified blended foods compare favorably in cost to both an optimized diet based on locally available foods, and the use of lipid nutrient supplements.

A number of 2016 studies looked at delivery methods for nutritious foods, examining coverage levels achieved through various models.

Aaron et al. tested two delivery methods in the context of a national program to scale up access to a complementary food supplement – KOKO Plus™, a micronutrient powder with added macronutrients – in rural and urban settings in Ghana.[9] The rural model, using health workers for product promotion and petty traders for product sales, was considerably more effective than the urban model, with 86% effective coverage (defined as product consumption in the previous seven days) during implementation and 62% effective coverage a few months after promotion activities stopped. The urban model, which used a market-based approach selling the supplement through micro-retailers accompanied by social marketing by a local firm, was less effective, achieving 9.4% effective coverage during the intervention. While the models were tested in different settings, these findings indicate that couching a nutrition product within health messaging – in the first model, government health workers provided general infant and young child feeding (IYCF) guidance, while NGO workers specifically promoted KOKO Plus™ – can effectively drive product uptake.

Leyvraz et al. studied the coverage of a fortified complementary food, Nutribon, among 6-23 month olds in Abidjan, Côte d'Ivoire.[10] The Nutribon project was led by Helen Keller International, in partnership with a local producer; the project team distributed Nutribon through retail outlets, including

[9] Aaron GJ, Strutt N, Boateng NA, Guevarra E, Siling K, Norris A, et al. (2016) Assessing Program Coverage of Two Approaches to Distributing a Complementary Feeding Supplement to Infants and Young Children in Ghana. PLoS ONE 11(10): e0162462. doi:10.1371/journal.pone.0162462.

[10] Leyvraz M, Rohner F, Konan AG, Esso LICE, Woodruff BA, Norte A, et al. (2016) High Awareness but Low Coverage of a Locally Produced Fortified Complementary Food in Abidjan, CoÃte d'Ivoire: Findings from a Cross-Sectional Survey. PLoS ONE 11(11): e0166295. doi:10.1371/journal.pone.0166295.

pharmacies, supermarkets, and shops, accompanied by a behavior change campaign. The study authors found that, while consumption of processed infant cereals was high in Abidjan, the effective coverage of Nutribon was quite low, with 5% of the households surveyed having given their child Nutribon in the last seven days. This effective coverage rate was similar between poor and non-poor households, but poor households were significantly less likely to have heard about Nutribon, and less likely to have tried it, as compared to non-poor households. Poor households expressed that cost was a barrier to trying the product. The authors conclude that product availability and awareness are not sufficient to drive uptake, particularly among poor households; this supports the targeting of poor households with fully subsidized FBF.

Nguyen et al. studied the effectiveness of a pilot project to distribute micronutrient powders (MNP) through sales to caregivers of 6-59 month olds via the health system in four districts of Vietnam.[11] The project, a joint initiative of GAIN and the National Institute of Nutrition of Vietnam, offered MNP's in three different pack sizes: single sachets, packs of 10 sachets, and packs of 60 sachets. The unit price of an individual sachet was the same across these pack sizes. The project trained health workers on the appropriate use of MNP's within the context of good YCF and WASH practices. Nguyen et al. studied the project's coverage via a cross-sectional survey conducted five months after product introduction. They found that while less than half of caregivers had visited a health center in the last year, 72% of those who had visited a health center had heard about the product, and 75% of those who had heard about the product had tried it at least once. The effective coverage of the MNP's, defined as the child having consumed at least three sachets of MNP in the last week, was 11.5% among all caregivers and 27.3% among caregivers who had visited the health center in the last month. The authors attribute the range of pack sizes with the relatively high rate of caregivers trying the product. However, there was a strong positive correlation between MNP purchases and wealth, indicating that poorer households still struggled to purchase MNP's; households with geographic barriers to accessing the health system were also much less likely to have used MNP's.

Review of New Literature in Agricultural Productivity

Sustainable intensification – increasing yields without adverse environmental impact and without the cultivation of more land[12] – has become a popular buzzword for policy makers and other primary stakeholders in the agricultural space, especially in Sub-Saharan Africa, where agricultural productivity has remained largely stagnant over the last 40 years, and has resulted in food insecurity, growing dependence on food aid and increasing poverty.[13]

[11] Nguyen et al. (2016) A Delivery Model for Home Fortification of Complementary Foods with Micronutrient Powders: Innovation in the Context of Vietnamese Health System Strengthening. *Nutrients:* 8, 259.
[12] Garnett T and Godfray C, *Sustainable intensification in agriculture. Navigating a course through competing food system priorities*, Food Climate Research Network and the Oxford Martin Programme on the Future of Food, University of Oxford, UK. 2012.
[13] Jama Bashir and Gonzalo Pizarro. *Agriculture in Africa: Strategies to Improve and Sustain Smallholder Production Systems.* New York Academy of Sciences. 2008.

A 2016 report by the Agricultural Systems Journal[14] argues that sustainable intensification can only be achieved through integrated investment in: (1) productivity innovation (e.g. improved varieties of seeds, fertilizer and new crop management systems), (2) natural resource management (NRM) innovation (e.g. reforestation and erosion control) and (3) institutional innovation (e.g. social infrastructure, policy, partnerships, access to finance, services, inputs and markets). According to the journal, a majority of intensification efforts – largely driven by civil society organizations – have been focused on productivity innovation or natural resource management, with very limited focus on institutional innovation. Because of this narrow approach, not much progress has been made in terms of increasing crop yields on the continent, despite significant on-the-ground investments.

Productivity and NRM innovations are intuitively popular with stakeholders because with a few relatively easy modifications to dated agricultural practices, yields can improve as quickly as after one harvest season. These two innovations provide ideal entry points for nonprofit organizations which frequently have limited funds and short time frames within which they have to pilot, scale up and exit from projects. In the last decade or so, there has been a shift in attitude as organizations working in this space have realized that focusing on improving yields alone is counterproductive if soil health continues to deteriorate, or if farmers are unable to convert their surplus crop into income. Because of this evolution in thought, the agricultural landscape is now dotted with projects that attempt to integrate at least two types of innovations; for example: working with farmers on one end to adopt modern agricultural practices and inputs to increase yields and, on the other end, using various contract farming models to provide these farmers with market linkages, or working with farmers to incorporate good agronomic practices with agroforestry technologies – to maximize crop yields and maintain healthy soils.

Projects that combine productivity and institutional innovations have become quite popular in recent years. These projects are mostly structured as contracts between large food processing companies and smallholder farmers, and have attracted political and financial support from many development agencies because they are usually designed to reform social landscapes and to build markets that are inclusive of small scale farmers – so as to improve the participation and benefits of these farmers in value chains.[15] These types of projects are generally quite sophisticated and complex and their implementation is often riddled with challenges. Between 2014 and 2016, the Syngenta Foundation for Sustainable Agriculture commissioned seven case studies examining different models of marketing and contracting partnerships that linked smallholder farmers in eight West African countries to higher-value product markets other than local spot markets; documenting outcomes as well as identifying factors that contributed to both the inclusion of small farmers and sustainability of the approaches used.[16] These case studies found that most of the outgrower schemes analyzed had mediocre results and even outright failures. They were widely characterized by contract breaches such as side-selling of farmer's

[14] Schut, Marc, et al. Sustainable intensification of agricultural systems in the Central African Highlands: The need for institutional innovation. *Agricultural Systems Journal,* vol. 145, 2016, pp. 165-176.

[15] IFAD Rural Development Report. https://www.ifad.org/ruraldevelopmentreport, September 2016.

[16] Staatz, John, et al. *Linking smallholders to profitable markets in West Africa: Case study synthesis*. Working paper no 2016-03. N.p: Michigan State University & Syngenta Foundation for Sustainable Agriculture, November 2016.

crop to spot traders – which undermined credit recovery, minimal yield improvements and poor qualities of crops due to inadequate post-harvest handling. Another contract farming example is Project Sunrise – a joint initiative between Oxfam and Unilever – whose goal was to integrate smallholder farmers in Tanzania and Azerbaijan into Unilever's supply chain. After three years, the project in Tanzania was abandoned when it was realized that the local fresh market paid far more than the global commodity price,[17] while the cost of the final product from the Azerbaijan project was more than four times the Unilever benchmark price for dehydrated onions. Additionally, a strategic review of this project concluded that the scale and impact envisaged by Oxfam and Unilever would not be achieved.[18] Similarly CHAI's agricultural work in Rwanda has had measured success. Despite providing focused extension support, linking farmer groups to moderately cheaper financing, and providing access to a market for the harvested crop, the anticipated outcomes have barely been achieved as yields have not improved over the last two seasons, financing mechanisms and relationships have been imperiled by loan defaults, and market linkages have been jeopardized because of contract reneging and widespread side selling of maize to local traders.

These outcomes demonstrate the conundrum that faces agricultural investors, particularly those investing in agrifood sector partnerships similar to those of Unilever and CHAI. Is it worthwhile to invest resources in a sector that has many unmanageable elements and is notoriously risky? Even disregarding the risks posed by adverse weather, there is a behavioral component on the part of smallholder farmers that contributes to a slow uptake of proven mechanisms of cultivating and storing crop which leads to poor yields and avoidable post-harvest losses. Syngenta's case studies in West Africa identified strategies that have helped contract farming projects to survive. These include:

- *Block farming:* In this model, a private company acquires a lease for a large acreage of land in order to establish a nucleus farm. Farmers who are displaced by this lease are allowed free use of a block of land on the nucleus farm and are obliged to sell their entire crop to the firm. Compliance within block farming schemes has been far higher than with outgrower farmer arrangements, especially with women block farmers who often have fewer options outside the program and are consequently very loyal. Block farming is, however, a risky proposition because tensions over 'land grabbing' can escalate quickly leaving the investor in an untenable position.
- *Reliance on social ties and personal screening of participants:* Contracts between parties that had close personal ties to each other and had developed trust and a common understanding were more likely to succeed. Such contracts are, however, only feasible with a very limited number of contracting parties and so they have limited scope for expansion.
- *Intermediate processing of crops in the field:* In this model, the food processing factory positions machinery (mobile processing units) close to farmers fields to either reduce the water content of the crop or transform it into a state that is more stable. This transformed product is then

[17] Vorley, Bill. *Big Brands like Unilever aren't the answer to helping Africa's farmers*. The Guardian Online. https://www.theguardian.com/sustainable-business/2016/aug/31/unilever-africa-farmers-inclusive-business-agrifood-development. Published 31 August 2016.
[18] Project Sunrise Final Report. Unilever & Oxfam. Published 2015

transported to the end user's site as needed. This model positions private companies at the farmer's gate enabling them to compete with local spot traders. CHAI's post-harvest processing pilot plans for the 2017 Season A are in line with this model.

- *Using intermediary aggregators:* Because buyers are often not close to farmers – either geographically or socially – intermediaries who know the farmers better and who may have specialized logistical skills could act as monitors and product aggregators for the buyers. These aggregators can be cooperatives, or other private entities for example Local Buying Agents who aggregate and sell paddy in Nigeria. In this model, it is critical to structure the incentives of the intermediaries so that they are consistent with the interests of the other parties in the contract.

The difficulties of contract farming schemes have spurred debate on whether other alternatives to linking smallholder farmers to markets should be pursued. One interesting idea is suggested in a 2016 article in the Guardian which argues that the solution to linking Africa's farmers to markets lies with the informal economy, which is dominated by unregulated micro, small and medium enterprises and is essentially the world's biggest private sector.[19] The informal sector is attractive to small farmers because it provides instant cash for crops sold without adding to the farmer the burden of contracts, membership to producer groups, delayed payments and strict standards for quality. On the other hand, the informal sector is an unattractive partner to government officials who view its actors as illegal, lacking quality standards and tax avoiding. As agricultural stakeholders give more attention to institutional innovation, and look for ways increasing access to finance, services, inputs and markets, the informal sector may increasingly be considered as a potential partner to farmers and governments alike.

[19] *Informal economy and green growth conference pinpoints need for new policy agenda*. IIED – International Institute for Environment and Development. 25 February 2016.

G. Sustainability and Exit Planning

The nutrition program has been designed with a focus on sustainability. CHAI is serving as a facilitator in the early stages of the program, helping to get the model up and running, ensuring that it has the desired impact, and then moving to roll out a proven model to new settings. Sustainability is the primary reason that CHAI is seeking to establish commercially viable joint ventures for production of FBF: successful companies will be able to continue producing FBF for government partners to drive the nutritional impact of the program. Guaranteed sales to the WFP were designed to address market risk as a temporary support in the early years of the ventures, while the companies build a commercial market that will drive profits in the medium- and long-term.

All of CHAI's programmatic support is undertaken in close collaboration with the appropriate government partners, positioning the program for long-term sustainability and success. In Rwanda, CHAI has appointed secondees to key government committees working on each aspect of FBF roll-out, both ensuring close collaboration between CHAI and the Ministry of Health, and allowing these roles to be taken over by the government if desired past the term of CHAI support. The program's approach to utilizing existing systems as much as possible will also contribute to sustainability: the FBF is being distributed through the health sector supply chain, rather than through a parallel system that could collapse without external support; and product education is being undertaken primarily by the health system, with support from local officials. CHAI has taken a similar approach to agricultural support in both Rwanda and Ethiopia, working closely with the relevant government agencies. While the Rwanda program has not yet shown the successful contracting relationships that could lead to sustainability, in Ethiopia the capacity-building work that CHAI has undertaken to date is well positioned for sustainability and successful contracting relationships.

CHAI has committed targeted support for the Ministry of Health in Rwanda to support product roll-out and monitoring in 2017. Over the course of the year, CHAI will phase down this support in order to avoid a sharp withdrawal going into 2018. In 2018 and beyond, CHAI aims to play a monitoring and troubleshooting role in Rwanda, along with continuing the impact evaluation. CHAI will work towards a similar role in the Ethiopia program.

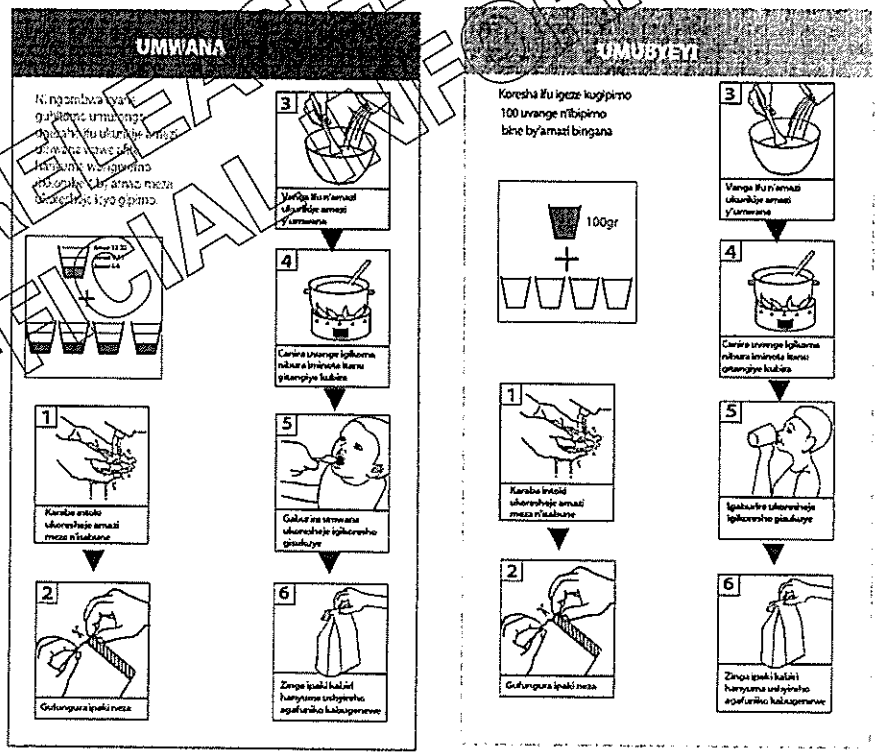
Annex: Information Sheet for FBF Beneficiaries in Rwanda

REPUBLIKA Y'U RWANDA
MINISTERI Y'UBUZIMA

RWANDA BIOMEDICAL CENTER
A Healthy People. A Wealthy Nation

Kibondo

Uko iki gikoma gitegurwa



DRAFT

Formal Monitoring Visit Report: CHAI

November 2015

Note: This template captures the minimum information expected from a formal monitoring visit. It may be necessary to capture additional information to support decision-making and learning.

Summary	
Key conclusions and follow-up actions	*Summarise key conclusions from the visit and what follow-up actions are required, e.g. how will conclusions be discussed with implementing partners and MFAT Staff?* The Ag TA team have established good relationships, developed a good understanding of the extension system and proposed some innovative ideas to improve production and reduce post harvest loss. We are confident that they will add value to the work the CHAI agriculture team are doing as there are clearly gaps in agriculture expertise within existing staff. The Ag TA team will submit a work plan and budget in late November and we hope to have this approved before Christmas. We have agreed to provide 120 days of TA per year. s9(2)(j) **Rwanda** We had hoped to see broken ground for the factory in Rwanda but there remain a few steps before this occurs, namely the handover of the land title (it has been purchased) and the resolution of tax issues for the engineering contractor. CHAI are confident that the estimated product launch date remains Q4 2016. **Ethiopia** Further delays in Ethiopia are likely as the JV remains under negotiation with several issues required to be resolved between the Ethiopian privitisation agency and AIF. Product launch is expected 6months after Rwanda, Q2 2017. The second factory in Ethiopia is planned for 1 year after the first, Q2 2018.
Report	
Purpose of visit	*What was the purpose of the visit, e.g. to help deal with problems, issues and questions)?* To accompany the CHAI TA on the visit to revise the TA workplan in Rwanda and to develop the TA workplan for Ethiopia. To ensure that the support provided is relevant, well coordinated with other extension strengthening interventions through the Ministry of

	Agriculture and will be effective. To receive and update on progress of the overall programmes in Rwanda and Ethiopia, especially in relation to factory construction and product launch timeframes.
Key areas of focus	*What were the key areas or dimensions that received focus?* • Ensuring the Ag TA have all information required to build a well informed and relevant TA plan. Including meeting with other donors and the AF commercial team. • Ensuring that good working relationships are established between CHAI, the ag TA and Ministries of Agriculture • To better understand why increase and production of maize were not relalised in the previous season. • Update on the progress of joint venture agreements, factory construction and product supply mechanisms. • To discuss proposed forward budget reallocation between Ethiopia and Rwanda. • To review DIFD proposed changes to the results farmework.
Participants	*Who participated in monitoring visit (e.g. activity manager, post staff, consultants, implementing partner staff)?* Ag TA Team: s9(2)(a) (AgFirst), s9(2)(a) (DAI) CHAI Rwanda: s9(2)(a), plus CHAI Rwanda Team CHAI Ethiopia: s9(2)(a) s9(2)(a) MFAT: s9(2)(a)
Environment / Context	*Was there evidence of a changing environment or context that may impact on the effectiveness of the Activity (either positively or negatively)?* **Rwanda** The previous season cheap maize flooded the market in Rwanda from Uganda and Tanzania. This caused prices to drop and combined with poor rains has impacted farmers. CHAI are not confident in the quality of the data collected on agriculture this season and thus the extent of this impact. s6(a) During meetings, several stakeholders raised concerns around the quality of data provided by the Government. DFID has recently moved to performance based on-budget support where tranches of funds are relased based on the achievement of agreed targets. There is a great emphasis placed on showing progress and data quality will receive much attention in the coming years. **Ethiopia** Famine. 9 Regional Governments – decentralised model. Important to have buy in at regional level. Government has a strong preference for locally sourced solutions

	and is discouraging importantion of packaged food from global companies, however, food processing in country has limited capacity to meet the need and to do so afforabily.
Implementation and delivering development results	*Was Activity Implementation progressing as planned – and what evidence of outputs and progress towards intended outcomes?* **Rwanda** Proposed TA Approach: Firstly, identifying knowledge of best practice (often in RAB guidelines) and train all extension support up to this level. May need additional training materials to achieve this. Then look at innovation and support to strengthen and update this guidance in partnership with RAB. This is where tapping into research and development where will be important. Structure of TA: 1. Strengthen extension support to farmers: Resources – (i) agronomy manuel for maize and soya targeted at extension agents (ii) farmer friendly resources (iii) famer extension officer tool kit. Training – (i) demonstration plots for innovation and to demonstrate best practice (ii) competitions for farmers e.g prize for the first to reach 5t/hectare – extension officers will need to have a training programme for this and the extension coordinator will receive a personal development plan. 2. Strengthen data collection systems (i) Develop a process for measuring farmer inputs and outputs (ii) Develop options for a digitial system to capture and centralise this infomraiton. 3. Innovation for post-harvest and mechanisation Role will be a 'thought partner' to conduct analysis, provide ideas and assit with their pilot. First initiative will be to conduct an analysis and pontetially a pilot of centralised shelling to reduce post-harvest loss. CHAI feedback: Very happy with proposed TA plan. CHAI have not made much progress in defining numbers from which to conduct a cost benefit analysis for coop investments, therefore greatly appreciate the emphasis on data. They would like a field perspective 'thought partner' of identifying bottlnecks and conducting analysis of how can be addressed. If the analysis demonstrates the need, CHAI can facilitate structuring loans to coops and sourcing cap ex. CHAI were very pleased with the collaborative way of working and approach taken by the TA team. **Ethiopia** Programme Update:

- Mothers prefer the porrage product rather than drink mix and energy bards. Branding research also undertaken.
- Imput quality tested with results showing that samples of the local crops were free from aflatoxins.
- The food product registration process has commenced.
- Negotiation with the Government of Ethiopia – term sheets signed for JB, committed t purchise 6,000 MT, JV legal documents drafted anda local partner for the joint venture formation identified and proposed.
- Local investor – screening invvestors but have not yet been made by main share holders. One company is interested.
- Next negotiations this mnth and think will be finalised. This has been the maory bottleneck for the programme. To implmenet agriculture we need the JB and factory online. AIF board meets today to approve points requested by Ethiopina government.
- Land has power, water and a shed.
- Timeframes, to start production mid 2017 in Ethiopia.
- Government is very committeed, and does not often enter into JB but convinced this is a social investment. Otherwise, government adr pritisation of sate owned enterprices.
- Drought, government want to buy food for children so this is impacting. Want to bu food for young children but need to import so this is putting this forward. Govt contribution cash.

3-6 months gap between the two factories.

- Still working on what will be the best distribution option for the product.
- Looking to align programme M&E with government PSNP system.

Ag Update

- 11 Unions identified in collaboration with government. 56 primary cooperatives (600 farmers average) sit under these. Very good capacity assessments have been done for Unions and Coopeartives. Unions have some good practices but room for improvement. Using the user manuals on cooperative management in collaboration with Oromia Cooperative Agency.
- 39,000 farmers will be supported. May need to scale back the number of unions once the factory requirments determined.
- IFC wil finance inputs to farmers. Local banks identified to process the loands inc Oromia local coopartive. Ground work for this being done but need JV to advance.
- Assisting to develop links with input suppliers and banks.
- As soon as JV signed will start agricultureal strengthening work in Amarha.
- Low input agriculture system with lack of skills leading to low production and quality.

Comment [DV(G1]: Could we use this for Ethiopia Dairy? Or find an NGO sub-contractor? CHAI happy to share

- Maize – post-harvest management and quality a major issue. Maize yield in selected cooperatives are producing over the national average 4.8MT/ha (3.43MT/ha). Some farmers are producing 8MT/ha. Some unions oranise inputs, including some that import inputs from abroad and this has led to the quantity increase. However, generally input use is lower than the recommended amount.
- ¾ of farmers get extension advice but only 52% believe that the service provided is suffidient to improve their agricultural activities.
- Mechanisation is low – 4% for land prep and 43% for threshing
- Soya: Less effort by government and limited awareness on soya technologies or experience growing. Low update and current yields 1.5MT/ha which is lower than national average of 2.2MT/ha. No training package for Soya.
- 92% report lack of rellable market main challenge to growing Soya
- Extension Approach: Supporting the existing public agriculture extension. Work is aligned to plaried GTP II which aims ot increase maize production, soya production and mechanisation.
- Focus will be at District level and Kebele (village) level. There are subject matter experts at the district level and ag extension workers at the Kebele level.
- Will collaborate with NGOs/networks. Maize, Oromia Agricultural Commercialisation Cluster – ATA initiative. Soybean through ILRI N2Africa aimed at legume value chain actors.

Comment [DV(G2]: ? Risk of converting farmesr to soya which does not have a traditional market in Ethipoia or Rwanda

Challenges

- Company formation which has caused the following cascading challenges:
- Sgining of agreements with Unions and coops
- Farmes acess to financial tools
- Training

Priorites

- Facilitate negotaitions
- Build capacity of coops and unions
- Design distrubtion system
- Support nutritional working groups
- Indepth assessment sof nutritional status of PLW and young children.

Ag – no regional ag staff yet as have not intensively started implementing due to the delays on the company agreement. In future may need to expand, AG TA may be able to advice. Currenlty staff include value chain coordinator (Misrak), coop coordinator, agiculture logsticis, microfinance coordinatior. Also

	collaborate with NGOs and call apon those to work together when required. At this point do not need Oromia coordintors but may and are open to this. Will likely put a coordinator in Amahara. Currently doing ground work but not actively working with farmers but planning to start early next year apon signing the JV. Once contracts signed with unions, finace will be sought – as the main constraint to farmers is the market it is important to get agreement sfirst. Will provide training in November/Dec to primary cooperatives on financial management to strengthen them. Following JV will start working on farmer training. Training on maize, soya and post-harvest developed in coordination with ministry of agriculture. This will be provided to extension workers together with information on how to transfer knowledge such as demonstration sites. There is also a model farmer system for Maize established already. 3 extension workers at village level, crop, national resources and livestock. Will teach extension workers about factory requirments, including texting of aflotocins. Farmer training centers there but not functional, need to encourage extension workers to use these. Would like a cost-benefit mechanisation analysis done for primary cooperatives. Some analysis has been done for threshing. Key priorities: - Soya - Extension approach – behaviour change and training methodology - Post-harvest for Maize
Partners, beneficiaries and other stakeholders	*Which stakeholders were available for discussion? What were their perceptions regarding the Activity? What evidence of relationships between key stakeholders? Are governance and management arrangements appropriate and working as planned?* s9(2)(ba) **CHAI Rwanda** s9(2)(ba)

	s9(2)(ba) A provincial extension coordinator will over see the 8 extension agronomists and report to s9(2)(a) The team will be working directly with the provincial extension coordinator and in coordination with s9(2)(a) **RAB** The revised extension model was designed in partnership with RAB. The RAB were also involved in selection of the CHAI extension agronomists and there will be a dottled reporting line up through the RAB system. Strong working relationships continue to be demonstrated with RAB. **AIF** Met with the AIF country manager, Prosper xxx. DFID EU **CHAI Ethiopia** 150 staff. Most located in Addis. Biggest overseas office. Small regional offices in Awasa, Tigray and Amahra. 5 big programmes: nutrition, vaccination, MNCH, health systems strengthening (hospital reform), Gates funding for childhood survival. Smaller programmes: supporting national laboratory, health financing programme to MOH to mobalise local and international sources (including health insurance analysis), and acess to medicines. -
Monitoring systems	*What evidence was there regarding the quality and functionality of monitoring systems? Did evidence 'on the ground' support the most recent monitoring information provided prior to the visit?* **Rwanda** The CHAI team are not confident the results of the farmer survey are accurate due to timing being aligned to crop price negotations. The TA team will work with CHAI to strengthen their systems for collecting information on farmer level inputs and yield. Currently farmers self-report which is unreliable. The CHAI TA team will also help CHAI determine how best to calculate the MFAT headline indicator 'value of additional production'. DFID are working with CHAI to refine the results matrix indicators

	and targets. Many indicators have been pushed out by one year due to the delay in factory construction but targets remain consistent. The impact indicators have not pushed back. DFID wish to review the targets at each annual steering committee meeting and make adjustments if required. This is part of their focus on adaptive management and may be a process that MFAT can learn from. The next steering committee meeting is likely to be held in early March. The annual report will be released in early January to fit with DFID requirments.
Risks	*Are risks adequately monitored and managed? Are controls and mitigations working as intended to reduce likelihood and consequences?* **Ag TA Programme** There is a risk that 120 days is not sufficient to effect change in farmer yields in both countries. The TA will need to be strategic about targeting their time to initatives that will produce the greatest impact. The CHAI extension team in Rwanda is well networked at the coop level, but at this point lacks acess to strong technical information, which is the gap the NZTA will fill. The Extension Coordinator who will manage the 8 extension workers will be a key focal point for the NZTA. This position is under recruitment and hopefully will be filled in the coming month. Establishing a strong relationship between the NZTA and the Coordinator will be critical. **Rwanda Ag Strengthening** CHAI are very aware of the risks involved in the agricultural strengthening component and working hard to mitigate these. Post harvest loss will be an area where the NZTA provides support to mitigate. The second area of concern is farmers willingness to grow soya beans as it is a new crop to many. The challenge is that farmers do not traditionally consume soya, therefore, if it is not bought by CHAI it has little value. The NZTA can assist with demonstration plots on how to grow soya, but farmer mobalisation will need to be achieved by CHAI. **Ethiopia Ag Strengthening** The

Annex

Themes/challenges:
Baseline data is not available for coops or extension such as basic soil tests such as ph, some soil suitability maps available but at too higher scale, moisture balance not available etc. Need

to have this information and get it out to farmers. Note, challenges with lab facilities in Rwanda and Kenya may make this not the most effective challenge to target.

Extension:

- Existing government sector agronomist overloaded by data collection, had a large catchment of farmers to support in multiple crops. Which is what led to the hiring of coop agronomists.
- 8 extension agronomicsts are engaged by CHAI who are into week 2 of their assignment. They have a good understanding of agronomy and are engaging which is a key skill. This is the group that will cause change at the field level.
- These agronomists will work with coops supported by a coordinator in the mayors office. They work in coordination with existing RAB sector extension officer and it will be important that the sector extension officer is included and not sidelined in the Ag TA support provided.
- The team observed a lack of good resources at the extension agronomist level and none at the coop/farmers level. This information flow will be a key issue addressed by the Ag TA.

Agronomy

- Weeding and fertalizer seems to be working OK.
- Density looks to be too low.
- Crop sweing timings critical. Perhaps more weather data would enable better timing
- Fertalizer use, standard recommendations Ok but not enough information is available on specific soil types. Appears that there are variations on how the recommendations are being applied due to manure availability.
- Pests and Diseases: two or three key pests. Farmers rely on agronomists, therefore they need to be very well trained in this area. Unsafe practices observed in chemical use.
- Irrigation: Drip irrigation observed for Maize is not appropriate and has not been maintained. The pivot irrigation, which cost millions, was not being used due to a fault. Many op and maintance problems observed. Cost of investment too much for low value crops such as maize, better use for high value crops such as tomatos. You need soil moisture information to know when to turn on and off to maximise use, but this is not being collected. There are also water and power costs to running pivot systems. There are doubts that the maize crop is able to recover the invested costs.

Mechanisation

- There is a physical limitation to mechanised cultivation in some coops. One coop used a tractor with good effect through a contracting system, other farmers noted they did not have acess to funds to contract in tractors. However, there is potential for overcultivation which damanges the soil structure and can negatively impact yields.
- The priorities for mechanisation will need to be identified along the production chain and analysis done to where will have the most impact.
- Note the more you mechanise, the less labour is required which can result in job loss.
- CHAI want to focus on the bottlnecks for throughput to the factory for mechanisation from an efficience perspectrive. For example, when grain can not be dried fast enough.
- The crunch point appears to be shelling, drying and transport to factory.
- There are options to source loans for coops using the facility that CHAI have established through KCB and other mechanisms. Some farmers have used their land totals to acess loans from coops that were facilitated by CHAI.

Post Harvest Loss

- Traditionally, cut with machettes (150-200kg/dag), hung from trees with a tarp (4-5 days to 1 month), then shelled by hand (50kg/day on alternate days) or with a manual sheller (100kg/day) if available. Grains are cleaned by tossing from a basket, some coops had a table with a mesh bottom. Grains are then dried on pavement or sheeting and stacked to 10cm. Grain then bagged and stored or sold. *Note that these figures are estimates from farmers.*
- Farmes asked for assistance with for cleaning and sorting, shelling and drying of grains.
- In addition, buildings (drying sheds and stores), pavement and means of transporting from farmers to coop such as a motocycle, and a 10 metric ton truck to take bad seeds to the market.
- Drying appears to be the process where the highest loss happens. This is due to rain impacting the moving of grain from farm to house, to tarpaulin, then transporting by hand (majority on head) to coop. This is especially difficult for farms far form the coop sheds. If a farmers has a 3 tonne yield, there would be 60 trips of 50kgs.
- Some coops mentioned 20-30% loss. One other activity is looking to bring it down to 15%.

<u>Workplan</u>

Key topics

1. Extenision – training and resources
2. Data collection
3. Mechanisation
4. Post-harvest loss
5. Innovation – mobile technology

1. Extension resources

- Farmer level resources: brochures and posters
- Agronomy manuel for Maize and Soya. Some information exists but not a consolidated set of information.
- Could consider introducing a digital platform for this. 70-80% farmers observed have a mobile phone. Potentail to create an ap that provides technical information that is easily updated and goes along the supply chain process. Can include photos, utube clips. For this to work, it needs to be backed up buy the information above. Extension workers will be given tablets. Information may include technical info, weather data, reminders and potentially land information. This provides an opportunity for the agronomists to collect useful data for reporting also. This will streamline data management. Could be easily adapted and rolled out in the other CHAI programmes in other countries.
- CHAI seemed supportive of this idea. The costs will need to be outlined before a decision can be taken.
- Training, need to ensure agronomists technically sound and stay up to date. Also need to review extension techniques. Need to set this up to be sustainable, potentially the extension coordinator leads.

2. Data Collection

- Lack of input data – you can't manage what you don't know
- Only two coops had computers and only one had full set of data including fertalizer and seeds.
- Coops currently estimating yields therefore data is poor.
- CHAI welcome assistance in this area.

3. Post-harvest

- CHAI have list of requests from coops and have requested assistance in prioritising this from the Ag TA. These include: drying sheds for cobs (there is no way to mechanically dry). The total cost of all coop requests is USD1.3milion dollars. The 10tonne trucks is a considerable cost at 106k which could be reduced. Mobile dryers is 117k. Cleaning 5k , shelling 4-13k, moisture meter$600. This does not include the construction costs, for LWH store druing shed and 210k for the three coops one coop paid for a drying shed with assistance from USAID and one by themselves with members donations 80k.
- Ag TA team suggested to estimate the loss at each stage and then analyse this against the cost of interventions. However, CHAI had tried this and the coops were unable to provide solid estimates on which to base this calculation.
- Proposal to transport grain from farm to coop on motorbikes to reduce loss.
- The factory started to accept maize at a higher moisture content as they have a dryer onsite that they can use
- Proposal put on the table by Ag TA to take corn once cut and transport to a central location to dry and shell. Question over farmers perceptions of selling cobs rather than grain. One coop said they would prefer this however, concerns that farmers will not be sure about pricing and that it would be fair. Cooperatives would like to take charge of cleaning and sorting as farmers do not do it well. As harvest and planting occurs at the sametime, this would reduce the time burden on farmers. There is already a good large scale dryer and storage at factory, therefore may only need to rent a thresher to test this. Perviously, there were challenges with maize dried at the factory and farmers perceptions of value of this.
- There is potential to source equipment from AIF for PHL, e.g moisture meters will be provided. In addition, there may be potential to source funding for cap ex from KCB for shelling.

4. Mechanisation

- As above

Formal Monitoring Visit Report: CHAI Rwanda & Ethiopia

March 2015

Summary	
Key conclusions and follow-up actions	• The Holding Company (HoldCo) formation has been further delayed s9(2)(ba) • s9(2)(g)(i) with these negotiations so MFAT, s9(2)(ba) have requested updates very 2 weeks. • s9(2)(ba), s9(2)(b)(ii) the MFAT-funded agriculture component is progressing, albeit slowly. We will ensure the upcoming tranche provides adequate cashflow. • MFAT Technical Assistance (TA) to CHAI needs to be agreed & finalised ahead of a proposed June visit. s9(2)(g)(i) s9(2)(g)(i) and workplan to talk through with s9(2)(b)(ii) • MFAT, ELMA & DFID have agreed on harmonised reports & results frameworks & are trying to find timeframe for annual joint visit that suits all stakeholders (inlcuidng harvest cycles). MFAT to confirm that all MFAT indicators have been captured in DFID's logframe. • Despite the above CHAI Rwanda country team have reported anecdotal increases in farmer production & incomes due to access to finance, inputs and farmer training. MFAT to receive update on project assessment in June. • CHAI Ethiopia have laid ground work for initiating agriculture and health/nutrition activities despite HoldCo delays but need to manage creating expectations with stakeholders.
Report	
Purpose of visit	• To discuss annual reports, meet with project stakeholders and assess progress to date.
Key areas of focus	• Update on finalising the HoldCo, the impact of the delay on farmers and clarity on next steps to product launch • Assessment of the impact of farmer support in Rwanda • Confirming requirements for the MFAT TA • Harmonising reporting and clarifying MFAT's requirements
Participants	• WLG Deputy Director, PRE Aid Manager, ELMA Foundation – s9(2)(a) , CHAI local & HQ staff - s9(2)(a) and s9(2)(a)
Environment / Context	**General** • HoldCo establishment has been further delayed initially due to disagreements between s9(2)(b)(ii) which has resulted in s9(2)(b)(ii) now holding the major stake. Consequently an additional

s9(2)(b)(i)	investor is now required to complete the deal and CHAI is in discussions with s9(2)(b)(ii) and as a backup s9(2)(b)(ii) . MFAT will monitor this closely as it will affect product launch & farmers' production and incomes. **Rwanda** • The Government of Rwanda's (GoR) support to CHAI continues to be positive and GoR co-signed cooperatives loan agreements as a guarantor • In support of the project, GoR has given land for the factory site at a prime silo and warehousing facility within the premises of the national grain reserves in Kigali. **Ethiopia** • CHAI remains engaged with GoE who appear supportive of the project pending finalisation of HoldCo. • The term sheet is still to be signed with the GoE and CHAI remains engaged with GoE who appear supportive of the project pending finalisation of HoldCo. • The GoE have committed to supply 6,000MT free as part of the food basket they provide to 7.5 million people reached and each factory will supply complementary food for 150,000 children each. • The government are keen to involve a local Ethiopia programme partner into the joint venture and CHAI did an Open Tender and after completing due diligence have two on the short list (including s9(2)(b)(ii) OOS local partner in Ethiopia). Final decision rests with international investors. • The Factory site has been identified in an industrial zone which will have all the necessary infrastructure as the World Bank has invested in it. • Preliminary assessment of construction companies has been done and it is planned that the second factory will be online 6 months after the first is established.
Implementation and delivering development results	**Rwanda** • In light of the HoldCo delay, IFC was not able to act as guarantor for local intermerdiary bank to loan to farmers cooperatives so CHAI did this themselves and agreements were co-signed by the government as guarantor. ETG agreed to purchase the maize produced by farmers. ETG has found a buyer for all maize – some at a higher price to the forward contract they put in place. • In the meantime, CHAI has signed a contract with the contractor who will contruct the factory and design plans have been finalised. The contractor is ready to commence once the HoldCo is in place. The equipment manufacturer Buhler has fianlised the factory's requirmeents in the meantime. • CHAI facilitated procurement planning for farmer inputs with key stakeholders to ensure quality and timely inputs were provided

to farmers. Although there were some procurement challenges with some poorly germinating seed, this seems to have been largely limited to a few areas.

- Farmer training for production and post-harvest activities was made available to coops through the Rwanda Development Organisation (RDO). Despite RDO trainers requiring capacity building themselves, anecdotal reports from CHAI & farmers we met with indicate that training was useful and maize production and harvest levels have subsequently increased.
- A post season assessment will be undertaken to accurately determine the impact and effectiveness of this support by RDO. The factory will not purchase all maize a cooperative produces (risk too high if something goes wrong) and farmers have others buyers. This answers our concerns about what happens to maize produced as result of any increase in productivity under project – no one seemed concerned with this creating an oversupply).
- Farmers opted to plant only maize in season A (Nov-Jan) and soya in season B (mid-year). CHAI is yet to determine if they will provide agricultural support in season B this year – but probably not, or opt to further analyse and prepare well for next season A.
- Nutritional activities have progressed at a slower pace due to the HoldCo delay and will likely advance once agreements have been signed and factory construction begins. However in the meantime CHAI has been working with the GoR to determine the appropriate distribution channels for the product and messaging.

Ethiopia

- For the next agricultural season CHAI will provide farmer training in production, quality assurance and post-harvest loss. There will be no financing provided until the term sheet & HoldCo are finalised. They will work through NGOs, the Cooperative Promotion Agency and the Agricultural Ministry to undertake extension training and have developed training manuals with their input.
- The regional government extension staff will train the local government extension workers in April.
- Training for extension workers, unions and cooperatives will be undertaken by NGOs who have been identified but are yet to be shortlisted and confirmed
- New Zealand's technical assistance scoping would be well timed if it occurred in early June, before planting commences in late June.
- CHAI will need to undertake a supply chain analysis when the factory construction is underway. The GoE would like the food distributed through the health Ministry's procurement system but CHAI s6(a) and prefer to use the Ministry of Trade which already distributes sugar and edible products to household level. Although it's worth noting that the Health Ministry's community health worker system is very comprehensive and will reach the 'last mile'. Capacity of that

	agency is an issue. UNICEF is a key potential partner for distribution especially for product and consumption take up.
Partners, beneficiaries and other stakeholders	**Rwanda** • Discussions were held with farmers who appreciated the financial support they had received through CHAI (loans) that did not require collateral. • They also appreciated the support from RDO which they said had improved their planning, financial and business practices in addition to their technical skills, from land prep to harvesting. • Farmers can now differentiate between good and bad seed, spacing seeds properly, prepare and apply organic manure, practice monoculture, understand pesticides control and can now calculate their cost of production. • The marketing support they had received was very valuable in light of the large yields they had achieved this season. • Farmers highlighted that their yield had increased due to using hybrid seeds, fertilizer and applying both properly e.g. adequate seed spacing and practising mono culture. Some farmers mentioned that their yields per ha had increased from 4 – 8 tonnes per ha. Challenges included: • They needed infrastructure to reduce their post-harvest losses • Farmers needed mechanization to increase their efficiency in planting and harvesting. • Meeting the quality standards of the contracts was challenging for coops because they were required to pay for further drying and sorting which increases their cost of production. **Ethiopia** • Agricultural and nutrition initiatives have not commenced in Ethiopia so meetings were held with potential partners: • Meetings with the revamped Oromia Agricultural Commercialization Cluster highlighted the scale of the country and the farmers who grow maize and soya in the region. They were expectant CHAI would be working with their farmers in the near future which CHAI will need to manage. • We met with a member of the Ambo Union Cooperative where it was clear that unions and coops require the access to finance and farmer training the CHAI plans to offer. Unions noted that participation by union members was low due to side selling and the negative experiences farmers have had in the past with state mandated compulsory coop membership. They also noted that potential for mechanisation for planting and harvesting was low due to the small land size, but noted that threshing machines and post-harvest facilities would be useful. • Ambo Health Centre meetings with health officers highlighted the need for nutrition initiatives focused on infant and child feeding. Though malnutrition was lower in semi urban areas, it was much

	worse in the rural areas. It was also clear that there was a comprehensive community health worker system in place for the project to work through once the fortified food was available.
Monitoring systems	• Only during this visit was MFAT informed that the HoldCo shareholding had shifted significantly as this had not been conmmmunicated earlier. As a result MFAT, DFID and ELMA have requsted updates every 2 weeks on the status of the HoldCo to manage CHAI's s9(2)(g)(i) on this. • The CHAI Rwanda & Ethiopia reports format and results frameworks are the same for both countries. The results framework received particular focus and how it could be harmonised to reflect the requirements of MFAT, ELMA & DFID. The combined results framework is very comprehensive and robust and MFAT will provide final feedback to ensure key MFAT indicators are included. • We will provide feedback on Annual Reports. They were clear and concise but lacked a summary of challenges, risks, and a workplan for upcoming year. We have still not received 2015 budgets. **Rwanda** • CHAI will undertake a post season assessment of the agricultural programme, comparing results to the baseline study • It was also clear the CHAI have a comprehensive monitoring process under way for the nutritional cohort study which has been approved by the key Rwandan nutrition authorities and the government and this will feed into the GoR's national data collection system. • CHAI is undertaking nutritional and household assessments of the 600 children currently aged between 6-18 months as a baseline for the project, and will be followed every quarter. These children will all 'age out' (ie reach 2 years) by the time the project is in place, and will therefore act as a control group for comparison. Once the product is ready for launching, CHAI will track 2,400 children for 18 months and they aim for the cohort study, which was approved by the GoR to feed into the government's data and monitoring systems. **Ethiopia** • An agricultural baseline assessment will commence in June. • The GoE is undertaking soil mapping exercise which will provide stakeholders with information on the optimal input and fertiliser application levels for varies zones across the country. This will feed into CHAI's farmer training. • The Nutritional M & E system will align with the GoE's system in addition to aligning with DFID and other nutrition partners. This is a prerequisite for DFID funding. Unlike in Rwanda where the aim is 100% coverage of children in the 2 poorer sectors of society, in Ethiopia universal coverage will not be possible. It

	will therefore be possible to follow a control group of children, not covered by the programme, once the programme has started. This is more robust from a monitoring point of view as to removes chances that time delay/external factors impact results.
Risks	Finalisation of HoldCo remains a high risk for CHAI in both Rwanda & Ethiopia. While MFAT is assured that CHAI are actively driving this and monitoring it closely, more can be done by CHAI to keep donors informed of challenges which have delayed establishment of HoldCo for more than a year now. s 9(2)(b)(ii); s 9(2)(g)(i) **Rwanda** • Despite the above CHAI has responded to the delay by funding farmers loans themselves which provided a useful learning opportunity for CHAI and befitted the farmers. However it is unclear if this will repeated for season B and it is unclear if/how/when this will/has been communicated to government and farmers alike. • In the meantime CHAI has put underlying agreements in place with IFC and government as well with the contractor who will construct the factory and Buhler who will supply the manufacturing equipment, to fast track progress once HoldCo is in place. **Ethiopia** • It was clear the HoldCo delay was creating expectations with some farmers and the Oromia Agricultural Commercialization Cluster who were expecting CHAI to purchase maize and soya in the next season. It's clear CHAI need to effectively manage their engagement with stakeholders s 9(2)(g)(i) • In the meantime CHAI Ethiopia have also undertaken ground work to facilitate faster programme operation once the HoldCo is finalised e.g. preliminary identification of farmer coops, preliminary assessment of construction companies and a tender to identify a potential local food processor to partner in the joint venture.