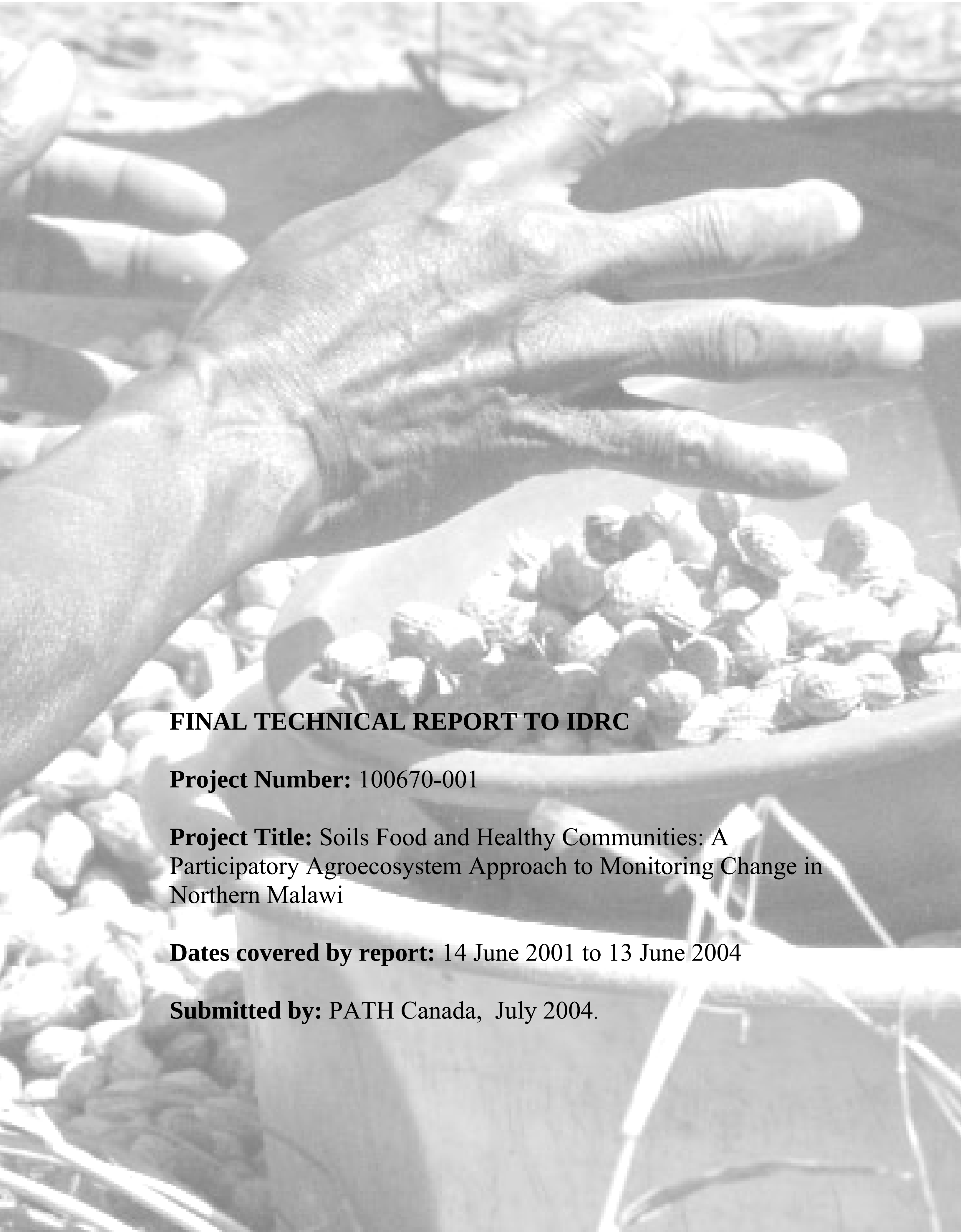


FINAL TECHNICAL REPORT TO IDRC

Project Number: 100670-001

Project Title: Soils Food and Healthy Communities: A Participatory Agroecosystem Approach to Monitoring Change in Northern Malawi

Dates covered by report: 14 June 2001 to 13 June 2004

Submitted by: PATH Canada, July 2004.

Table of Contents

Appendices

Synthesis

The Soils, Food and Healthy Communities project is a participatory agroecosystem approach to monitoring change in northern Malawi. The overall goal is to improve the health of resource-poor households in northern Malawi through a participatory pilot research project that introduces legume systems and which uses an ecosystem approach to examine the linkages between food security and health. The project is a collaborative effort between the Ekwendeni Primary Health Care Department in Malawi, PATH Canada, and Cornell University. Overall implementation of the project is the responsibility of the PHC in Malawi; the role of PATH Canada and Cornell is to provide technical assistance specifically on the research components
This final report covers the entire project period of June 2001 through June 2004. However, the first two years were reported in detail in the previous interim reports, and so this report provides most detail on the period June 2003 to June 2004. As in previous reports, the emphasis herein is in technical issues (for which PATH Canada is responsible), with only some mention of overall management of the project (for which Ekwendeni PHC is responsible).

Summary of research findings to date:

> *Legume systems appear to improve soil fertility and provide an additional, nutritious food crop. Participation in SFHC results in positive changes in feeding practices of young children. It may also result in improved anthropometric status.*

Timeline of agriculture cycle and project activities.

A project timeline, together with the agriculture cycle is laid out in the following table. This is useful for understanding how the different aspects of the project fit together, as well as interpreting survey results. In order to know if observations are plausibly due to project activities, it is necessary to know when the project activities occurred relative to the timing of the surveys.

Timeline of the Agriculture Cycle and Major SFHC Research & Development Activities 2000-2004

	2000-01						2001-02: Severe Hungry Season from Dec - May					
	June-July	**Aug-Sept**	**Oct-Nov**	**Dec-Jan**	**Feb-March**	**April-May**	**June-July**	**Aug-Sept**	**Oct-Nov**	**Dec-Jan**	**Feb-March**	**April-May**
Agriculture cycle	Harvest: Maize, soya, groundnuts	Least labour in year. Harvest ppeas (Sept)	Land prep, Early planting	Planting, Weeding Early hungry season	Hungry Season, Weeding Early maize harvest	Harvest: soya, gnuts, early maize	Harvest: Maize, soya, groundnuts	Least labour in year. Harvest ppeas	Land prep., Early planting	Planting, Weeding Early hungry season	Hungry Season, Weeding Early maize harvest	Harvest: soya, gnuts, early maize
Development Activities	Project begins. FRT selected. RBK & FRT to Mponela to learn about OMTs.	183 farmers get training on legumes Seed procured.	Planting of 183 farmer trials and 7 village plots.	Supervision of plots.	Supervision of plots.	Field Day.	IDRC contract signed	Seed procurement. Farmer training.	Planting of 456 farmer trials and 11 village plots.	Supervision of plots.	Supervision of plots.	Field Day.
Research activities	Qualitative research on food security, gender issues and local indicators (RBK)	Qualitative research with FRT on local indicators (RBK)	Participatory rural appraisal research done (MC)		Baseline nutrition survey (DC, MC)	.	Participatory Yield Collection (MC) Inception Workshop with IDRC.	Qualitative research on child care and feeding done (RBK, TT, MC)	Food security indicators developed (MC, TT, KN, SM) Agric BL survey. Soil sampling.	Design of Hungry Season survey (RBK, JK, MC)	Qualitative research on child feeding practices (RBK, SM, TT) Hungry Season survey.	Data entry.
Staff changes	Gaston as team leader with help from RBK & CCAP. B. Kamanga helps with field trip.	MC hired				RBK arrives	TT arrives (for 8 months). PATH Canada joins project.		KN hired as agric asst. LD hired as accountant. SM hired as nutritionist.		RBK arrives for 6 weeks to help with survey and qualitative research. TT leaves	

	2002-03						2003-04					
	June-July	**Aug-Sept**	**Oct-Nov**	**Dec-Jan**	**Feb-March**	**April-May**	**June-July**	**Aug-Sept**	**Oct-Nov**	**Dec-Jan**	**Feb-March**	**April-May**
Agriculture cycle	Harvest: Maize, soya, groundnuts	Least labour in year. Harvest ppeas (Sept)	Land prep., Early planting	Planting, Weeding Early hungry season	Hungry Season, Weeding Early maize harvest	Harvest: soya, gnuts, early maize	Harvest: Maize, soya, groundnuts	Least labour in year. Harvest ppeas	Land prep., Early planting	Planting, Weeding Early hungry season	Hungry Season, Weeding Early maize harvest	Harvest: soya, gnuts, early maize
Development Activities		Seed procurement. Farmer training.	Seed distribution for 983 farmer trials and 48 village plots.	Supervision of plots.	Supervision of plots. Formation of Nutrition Team.	Field Day.	Nutrition education (AS, FRT, NT)	Seed procurement. Farmer training. Nutr ed (AS, FRT, NT). Aug nutr wrkshp with DC.	Seed dist'n: 1700 farmer trials, 77 village plots (MC,LD,RBK, JS, AS) Nutr ed (AS, FRT, NT). Soya bean & gnut trials initiated.	Supervision of plots. Nutr ed (AS, FRT, NT)	Supervision of plots. Nutr ed (AS, FRT, NT)	Field Day. Participatory Seed Workshop. Nutrition education (AS, FRT, NT)
Research activities	Participatory Yield Collection (KN) Design of Post Harvest survey.	Post Harvest August 2002 survey	Qualitative Gender Analysis (CK, MC, LD, KN, SM) Soil sampling done.	Census done (MC, KN, LD, DR) Pre-harvest Anthropometry done (KN) Qualitative research done (MC)	Participatory Nutrition Workshop. Qualitative research on seeds (RBK, MC, KN)	Ongoing data entry & analysis.	Participatory Yield Collection (FRT) Ongoing data entry & analysis	Agronomist visit & analysis (Patson Nalivata) Ongoing data entry & analysis	Ongoing data entry & analysis	Anthropometry (KN, MC, AM) Ongoing data entry & analysis	Qualitative research on root water/child feeding. (RBK, MC, LS, LD, AS)	Qualitative research on crop residue, seed exchange (RBK, LS, MC, LD, FRT)
Staff changes	Gaston leaves; replaced by Kistone Mhango.	JK arrives to supervise survey.	SM resigns.	DR arrives as PATH intern. JK resigns, PB replaces.	RBK arrives (2 months). JS hired as temp data entry clerk.	KN resigns. DR leaves.	AS hired as community nutrition promoter	RBK arrives for diss year PB visits.	LS hired as Ass't project coordinator.			PB visits. AS and JS complete contracts.

Legend

MC	Marko Chirwa	FRT	Farmer Research Team	NT	Nutrition Team	TT	Tanya Trevors	JK	Julia Krasevec
KN	Keston Ndlovu	RBK	Rachel Bezner Kerr	DC	Dorothy Chilima	SM	Solomon Mkumbwa	LD	Laifolo Dakishoni
PB	Peter Berti	DR	David Ryan	AS	Angela Shonga	LS	Lizzie Shumba	JS	Jonah Singyangwe

The Research Problem

Research Goal
To improve the health of resource-poor households in northern Malawi through a participatory pilot research project that introduces legume systems and which uses an ecosystem approach to examine the linkages between food security and health.

Research Objectives
Research objectives are divided into three categories: Planning, assessment & Training; Organic matter technology experimental trials; and Monitoring changes and seeking solutions. While PATH Canada is providing technical support in all areas, the focus of our work is on monitoring changes and seeking solutions using an ecosystem approach as it pertains to human health. The specific subobjectives in this area are:

- To evaluate various organic matter technologies with respect to their effect on household food security and dietary diversity in resource-poor households.
- To examine the linkages between food production, food consumption and health and to use an ecosystem approach to seek appropriate solutions to problems encountered throughout the research process.

Research Findings

Between June 2000 and June 2004 the Ekwendeni Soils, Foods and Healthy Communities Project conducted twenty-four different research activities of varying nature, including focus group discussions, semi-structured interviews, participatory mapping exercises, anthropometry and hemoglobin measurements, questionnaires and soil sampling (see Appendix A). PATH Canada has directly contributed technical support to twelve of these research activities, through the activities of Rachel Bezner Kerr, Julia Krasevec, Sian FitzGerald, Tanya Trevors, David Ryan, and Peter Berti. Almost all of the data entry and cleaning, and interview transcription has been done, and preliminary analyses carried out. More advanced analyses have been done on a number of variables, particularly anthropometrics, legume consumption, and complementary food introduction.

Many of the tangible technical results are the data analysis and written reports on a variety of issues. These reports are included as appendices and include:

Appendix B: Relationship between Early Introduction of Foods and Anthropometric Status in Ekwendeni.
Appendix C: Relationship between Early Introduction of Foods and Diarrhea in Ekwendeni.
Appendix D: Report on changes in legume consumption of young children in control and intervention villages.
Appendix E: Report on changes in anthropometrics and hemoglobin in control and intervention villages.
Appendix F: Report on results of OMT Experimental Plots.

The brief summary of the research findings to date are:

> *Legume systems appear to improve soil fertility and provide an additional, nutritious food crop. Participation in SFHC results in positive changes in feeding practices of young children. It may also result in improved anthropometric status.*

Project implementation and management

PATH Canada devoted much time to team capacity building, developing a stronger research team, organizing and supervising data entry, managing data and carrying out data analysis. SFHC staff learned new skills and improved on existing abilities in organizing and facilitating workshops, carrying out focus group discussions, doing anthropometry, managing data with EpiInfo2002, interpreting survey results, writing reports, and making scientific presentations. The intended role of PATH Canada in the SFHC project was largely on technical issues, but given the large number of days PATH Canada staff, interns and consultants spent in Ekwendeni, involvement in project management was unavoidable. Julia Krasevec (approximately 3 months in Ekwendeni), David Ryan (4 months), Tanya Trevors (6 months), and, especially, Rachel Bezner Kerr (18 months) did significant amounts of project management and strategic planning. (The activities of Bezner Kerr in the past year, in which she lived in Ekwendeni, are highlighted in Appendix G.)
During Peter Berti's visits (September 2003 and May 2004), activities were largely technical (data management, analysis and interpretation), including proposal writing, and not project management.

Project outputs and dissemination

PATH Canada has an advisory role; most of the project's outputs will be reported in the reports of the implementing partner, Ekwendeni PHC. Specific outputs for which PATH Canada is responsible are shown in Appendices B through F.

Capacity-building
The focus of capacity building has been on: computer skills, data collection (quantitative and qualitative), data entry, staff management, participatory methods, workshop facilitation and scientific presentations. There has been extensive capacity building in terms of organic matter technologies of participating farmers. Through ongoing communications and site visits, PATH Canada has contributed to this skills development of the project manager, Mr. Marko Chirwa. Through the PATH Canada interns and work of Berti and Bezner Kerr, the data entry, data management, and data analyses skills have been developed. All staff have received training in qualitative research design, implementation, field notes, analysis and report-writing.

Impact

The impact of the research conducted in this project on the broader nutrition and agriculture research communities will be seen more in the next year as the results of this work are published and disseminated. One paper has been submitted to the journal *Ecohealth* and publication is anticipated in the coming months. We anticipate writing additional papers on legume systems and on complementary foods and child health in the coming months.

As reported previously, the impact of the research on the implementation of the project itself is being felt immediately. For example, as we improve our understanding of why certain feeding and health practices persist, the project nutrition team (the teams of villagers that are delivering the nutrition messages to the villages) can better design nutrition education messages to reach the most vulnerable individuals with targeted and appropriate health messages. The implementation of the project continues to improve as the SFHC team acquires a better understanding of the Ekwendeni ecosystem.

Recommendations

As reported in the appendices, the project is having a measurable and marked effect on child health. This is NOT common for agriculture interventions and we are very pleased with the progress. We want to continue our work, and we look forward to the funding of Phase II.

Appendix A. SFHC Research Activities Conducted: 2000 – March 2004

Date	Activity	Person Responsible	Data Entry	Data Analysis	Report Written	Feedback to the community
Jun – Aug 2000	30 semi-structured interviews, 2 seasonal calendars, Initial discussion of local indicators	Rachel	Done	Done	IDRC Ganyu Paper	At FRT meeting
Dec 2000	PRAS for all villages	Marko	N/A	N/A	No	Yes
May 2001	Baseline Nutrition Survey	Dorothy Chilima	Done	Done	Yes	At June 2001 workshop
Jul – Sep 2001	Qualitative research on childcare and feeding	Marko, Rachel and Tanya	Done	Preliminary	Yes	At Particip-atory Nutr Wrkshp Feb02
Sept 2001	Soil Sampling	Communities with Marko and Dr.Sakala	Done	Yes	Yes	No
Nov 2001	Agriculture baseline survey	Marko, Keston, Solomon, Laifolo,Tanya, Rachel, Peter	Done	Preliminary	No	Preliminary, at Seed Wrkshp, May 04
Dec 2001	Food security indicators, PRA	Marko, Keston, Solomon	Done	Preliminary	IDRC	Yes
Feb 2002	Qualitative research (FGD) on childcare and feeding	Marko, Solomon, Rachel, Tanya	Done	Preliminary	Yes	At Particip-atory Nutr Wrkshp Feb03
Feb 2002	Hungry Season Survey Short Long 24 Hr Recall Anthro/Hb	Team	 Done Done Done	 Mostly done Preliminary for workshop Yes	 Two internal reports done Drama Yes	 At Particip-atory Nutr Wrkshp Feb03 and feedback session Jan 04
	Preliminary seed interviews	Marko, Rachel	Done	Yes	No	Yes
Apr 2002	Participatory evaluation: OMTs	Keston	Done	Done	IDRC	
	Biomass Sampling	Communities with Keston	Done	Not Done	No	
Jun–Jul 01/02	Participatory Yield Collection	Community	Done	Yes	Internal report	Yes
Aug 2002	Pre Harvest Survey Short Long 24hr Recall Anthro/Hb	 Keston, Marko, Laifolo, Solomon, Julia, Rachel, Peter	 Done Done Done Done	Done (factors affecting legume consumption, and timing of running out of maize) Preliminary Done (diffs bn control and intervention)	 Yes Yes	 No

Date	Activity	Person Responsible	Data Entry	Data Analysis	Report Written	Feedback to the community
Sept 2002	Inter/Intra Household FGDs, maps, seasonal calendars, activity profiles, daily activity profiles, access and contribution, decision making, driving and straining forces	Carol trained Keston, Laifolo, and Sumwaka	Done	Done	Yes	Yes (incorporated into two feedback sessions in Jan and May 04)
Sept 2002	Soil Sampling	Community, Keston, Patson Nalivata and Team	Done	Yes	Yes	Yes
Jan 2003	Census	Keston, Marko, Laifolo, David, Enumerators	Done	Not Done	No	No
Jan 2003	Mapping	Laifolo, Marko and Lucy	Done	No analysis required	Partially	No need
Jan 2003	Anthro and Hb	Keston, David and enumerators, Peter	Done	Done (diffs bn control and intervention)	Yes	No
Jan 2003	Qualitative	Marko, Laifolo and Lucy	Not Done	Not Done	No	No
Feb – Mar 2003	Seed Interviews	Rachel, Keston and Angela	Ongoing	Preliminary	Presentati on	Yes (at Seed Workshop)
Feb 2004	Anthro and Hb	Team	Done	Done (diffs bn control and intervention)	Yes	
Mar 2004	Qualitative research on 'root water' and child feeding practices	Rachel, Marko, Laifolo, Lizzie, Angela	Done	Done (initial); new UT Co-op student to do further research for nutr education.	Yes (co-authored by Marko and Rachel as capacity building exercise)	Yes, at FRT monthly meeting
April 2004	Qualitative research on legume expansion, crop residue use and seed exchange	Rachel, Lizzie, Marko, FRT	Done	Done (initial)	Yes (co-authored by Lizzie and Rachel as capacity building exercise)	Yes, at FRT monthly meeting

Appendix B: Relationship between Early Introduction of Foods and Anthropometric Status in Ekwendeni.

25 September 2003

Data Set: HSS March 2002
Program: "Anthros and weaning foods3.sas"
Data sets used:
- Anthropometrics, from Dave Ryan 5 feb 2003: anthromergefinal.csv
- Timing of introduction of weaning foods: from Dave Ryan 5 feb 2003: P3.por (question 18, table 2)
Merge data sets by variable "CHID"

Sample size: 6-12 months: 26
12-24 months: 86
6-24 months: 112
> 24 months: 48
TOTAL: 160

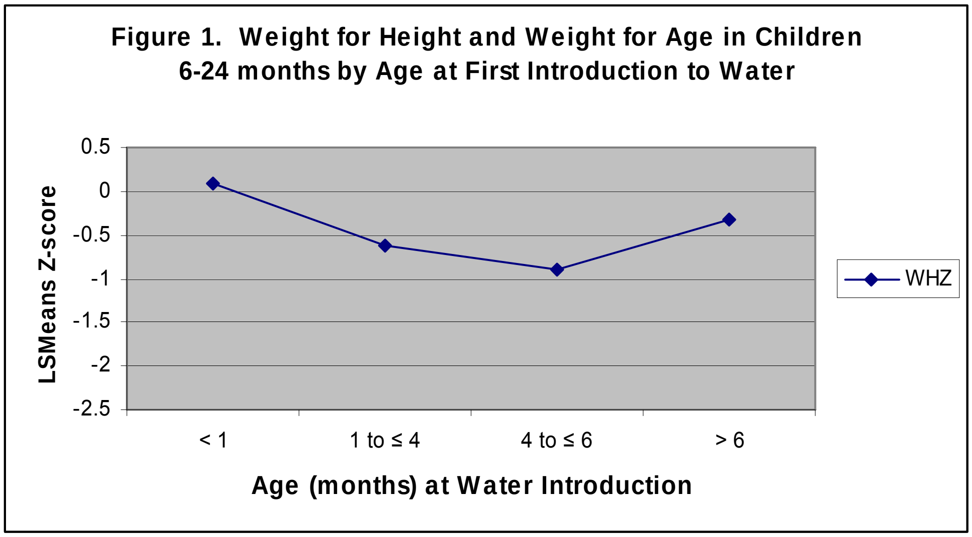
Model: A GLM, where the independent variable is HAZ, WAZ or WHZ, and the dependent variables are age at introduction of water, of mzuowola, and of porridge. Ages at introduction are classified as < 1 month, 1-4 months, 4-6 months, and > 6 months or never (that is, the child is > 6 months of age, but has not been introduced to the food).
The model is run for two separate age groups: 6 to 24 months, and > 24 months. Porridge includes porridge with chinthipu, dawale porridge, porridge with mgaiwa, and porridge with chintuwe, so the earliest age of introduction of any of the four porridges was used. The dependent variables are treated as fixed effects in this model.

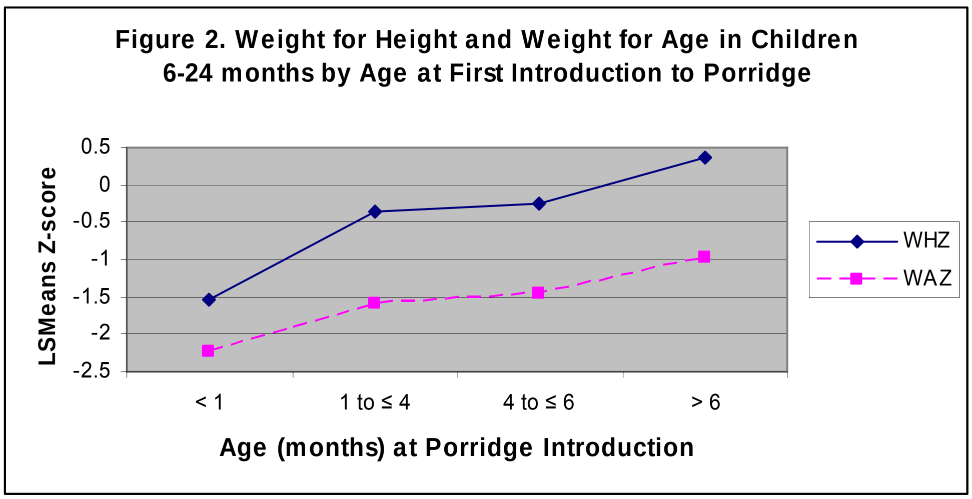
Results.
The p-value for the overall model, and the overall r^2 (if $p < .05$) are shown in the Table 1. Significant relationships ($p<.05$) for the individual food types are marked "*". The significant results are depicted in more detail in Figures 1 and 2.

While there were some "significant" results for the age group > 24 months, they did not appear to be meaningful or useful and are not reported further.

Table 1. Results of test of relationship between anthropometrics and timing of introduction of three food types.

	Overall		Individual Food Types		
	p	r^2	Water	Mzuowola	Porridge
HAZ	.55				
WHZ	.007	.19	*		*
WAZ	.03	.16			*





Discussion:

Feeding foods other than breast milk during the first six months of life displaces the more nutritious breastmilk from the infant's diet and risks introducing pathogens to the child, which causes diarrhea. Unlike breast milk, other foods and liquids are often not sterile and safe for the child. The health consequences of not following these guidelines have been demonstrated in numerous settings, in numerous studies, and are supported by anecdotal observation of Ekwendeni Hospital staff. For these reasons, feeding anything other than breast milk is discouraged by Ekwendeni Hospital.

From earlier qualitative research conducted by the SFHC Team, and from other aspects of this survey, we know that exclusive breastfeeding (EBF) for six months is usually not practiced in the Ekwendeni catchment area. Only 10% practice EBF for 4 months, and 1% for six months. The most commonly introduced foods are mzuowola, maji (plain water) and various types of porridge (for more detail, see the PATH Canada Year 2 Technical Report to IDRC for the SFHC project, and the report to the nutrition team entitled "Introduction of Complementary Foods in Ekwendeni: Timing, Reasons and Decision Makers.", available at the SFHC office).

With this data set, we have demonstrated that there is a direct relationship between early introduction of specific foods and Weight-for-Height (WHZ) and Weight-for-Age (WAZ) Z-scores later in life, with the most important type of food being porridge. While early introduction of water is significantly associated with being underweight, the direction of this association seems ambiguous. With porridge, on the other hand, there is a direct "doseresponse" between age at introduction and weight later in life. Interestingly, there is no statistical relationship between anthropometric status and "age of introduction of any food" (or to say in a different way, months EBF). It is porridge which seems particularly harmful.

This relationship is biologically plausible. The porridge given to the infants is thin and unnutritious, but filling. It reduces the amount of breastmilk that they would consume. Furthermore, the porridge is usually made in the morning and then left out to be fed to the infant throughout the day. The cooled porridge would be prone to contamination with harmful pathogens. While children *can* recover from early malnourishment and disease, it requires good nutrition and a clean environment. With the generally poor diet and high incidence of diarrhea throughout childhood, it is not surprising that insults during infancy can still be observed in early childhood.

While the porridge-weight relationship may indicate causality, there is not evidence in this data set to support a causal relationship. The early introduction of porridge may be associated with other harmful, but unobserved, behaviours, or be a general marker of food insecurity, maternal education, or some other macrolevel variable. Yet, given the biological plausibility of the relationship, and the importance of reducing early introduction of foods, encouraging EBF and, in particular, discouraging early introduction of porridge, should be a priority in nutrition programs in Ekwendeni. From other parts of this survey, we know that porridge is usually given because the mother believes the child is crying because of hunger. A nutrition education campaign that informs mothers of the adequacy of a mother's milk supply may be an appropriate starting point.

Appendix C: Relationship between Early Introduction of Foods and Diarrhea in Ekwendeni.

25 September 2003

Data Set: HSS March 2002
Program: "Diarrhea. and weaning foods1.sas"
Data sets used:
- Age from Dave Ryan 5 feb 2003: anthromergefinal.csv
- FFQ (last 7 days) from Dave Ryan 5 feb 2003: P14.por (FFQ on final page)
-diarrhea data: from Dave Ryan 5 feb 2003: P5.por
Merge data sets by variable "CHID"

The FFQ included 27 foods, plus 6 types of porridge which were added together and entered as "porridge". The question for FFQ over last 7 days was for how many *days* was the food consumed, but some enumerators appear to have interpreted this as how many *times*, so there are answers greater than 7. The data were analyzed therefore as binary responses (yes or no consumed food over last 7 days).

Sample size:
0-6 months: 26
6-12 months: 26
12-24 months: 86
> 24 months: 48
TOTAL: 186

Model:
The data were analyzed as 2x2 tables (consumed food in last 7 days Y or N, had diarrhea in last two weeks Y or N). Significance testing was done with the Cochran-Mantel-Haenszel Statistic, but given the small sample size, the tests had low power.
The testing was restricted to the 6-12 month old children, those who should have been exclusively breastfed (EBF), and if they were not, would be hypothesized to have higher incidence of diarrhea.

Results.
There were 8 foods consumed by infants (0-6 months) during the 7 days prior to the interview; the percent consumers is shown in Table 1, as well as the percent of infants who consumed the food in the last 24 hours, and the average and maximum number of times the food was consumed.

Table 1. Frequency of Consumption of Foods in last 7 days and last 24 hours in infants (0-6 months).

	% consumers		Times consumed (consumers only)
Food	in last 7 days	in last 24 hours	In last 24 hours (mean, max.)
Water	73%	62%	2, 4
Porridge	38%	35%	1.8, 3
Soup	19%	19%	1.8, 4
Nsima	15%	8%	1.5, 2
Yellow vegetables	8%	0%	-
Infant formula	4%	0%	-
Milk	4%	0%	-
Starch vegetables	4%	0%	-

Of the 26 infants surveyed, five (19%) reported having diarrhea in the last fourteen days. The incidence was higher in the older children: 6-12 months, 63%; 12-24 months, 56%; > 24 months 50%.

The cross-tabulation of diarrhea incidence and food consumption is shown in Table 2.

Table 2. Incidence of diarrhea in non-consumers and consumers of various foods, in infants 0-6 months of age (n=26).

	Any food	Water	Porridge	Nsima	Soup
			Consumers		
n consumers	20	19	10	4	5
Diarrhea incidence	25%	26%	30%	75%	40%
			Non-consumers		
n	6	7	16	22	21
Diarrhea incidence	0%	0%	12%	9%	14%
Test of Difference*	-	-	-	P=.026	-

* test for difference of diarrhea incidence between consumers and non-consumers using Cochran-Mantel-Haenszel Statistic.

Discussion:

Feeding infants foods other than breast milk exposes the infant to pathogens and puts the child at risk for diarrhea. This risk is especially high in settings, such as Ekwendeni where sterilizing food and keeping it sterile is difficult. In the analyses described above we tested for differences in diarrhea incidence between consumers and non-consumers of specific foods (or of any food).

The difference between consumers and non-consumers in diarrhea prevalence is striking, with 0% of the EBF infants experiencing diarrhea. However, the sample sizes are very small, with only 26 infants in the survey, and only five (19%) reporting diarrhea in the last two weeks. This small sample size limits power, and there are few significant differences between consumers and non consumers. Similar information has been collected in other surveys and as these data are entered and analyzed, we will pool the samples and test again for differences in diarrhea between consumers and non-consumers.

While these results are not “significant”, they are in the direction of biological plausibility and provide support, however weak, to support the benefits of EBF in Ekwendeni. As we continue our surveys, we will further test these relationships.

Appendix D: Report on changes in legume consumption of young children in control and intervention villages.

May 2004

Data Set: BL Survey, August 2002
Program: "SFHC postharvest.BL Aug 2002 various.sas"

Sample size: 88 households with children under 2 years, 57 in intervention households and 31 in control households.

Model:
The children's consumption of each of six types of legume was recorded as: Never, 1/month, 2-3/month, 1-2/week, 3-5/wk, or Every Day. Fisher's Exact test was used to test for differences between intervention and control households.

The categorical frequencies were then converted to numerical, where never=0, 1/month, 2-3/month=3, 1-2/week=6, 3-5/wk=16, and Every Day=25. The frequency of consumption of any type of legume was calculated by summing across all six types of legumes. The frequency of consumption was then modeled as:

Legume days per month = treatment + confounders/covariates + interaction,

where the confounders/covariates tested included:
Mother's Age, Mother's Education, Mother's Main job (mostly farmer or stay-at-home), Child's age, Mother's perception of child growth, Number of meals child eats per day.

Also tested if there were differences in number of meals per day by treatment group.

Finally, we tested the effect of the source of the seeds, using the model:

Legume days per month = source of seeds

Where the "sources of seeds" included SFHC and seven other projects: Micah, Aids Orphans, PHC Seed Multiplication Program, Cadecom, PHC Fertilizer Program, PLAN, CCAP Synod, and Other.

Results.
In Tables 1a and 1b the frequency (not amount) of legume consumption by children in intervention and control households is shown. The most commonly consumed legumes are groundnuts, with 72% of the sample reporting consumption. The least commonly consumed are cow peas with only 1 consumer reported. Soya beans are consumed more frequently by the intervention children (61%) than the controls (23%) (Fisher's Exact, p=.003).

Table 1a. Legume consumption in children in intervention (n=57) and control (n=31) households.

Legume	Never	Ever	1/ month	2-3 /month	1-2/ week	3-5/ week	Every Day	P[1]
Groundnuts	**26**	**62**	**2**	**25**	**16**	**10**	**9**	**0.12**
Intervention	*16*	*41*	*1*	*16*	*8*	*10*	*6*	
Control	*10*	*21*	*1*	*9*	*8*	*0*	*3*	
Soya beans	**46**	**42**	**5**	**6**	**9**	**8**	**14**	**0.003**
Intervention	*22*	*35*	*3*	*5*	*6*	*8*	*13*	
Control	*24*	*7*	*2*	*1*	*3*	*0*	*1*	
Pigeonpeas	**68**	**20**	**10**	**10**	**0**	**0**	**0**	**0.11**
Intervention	*40*	*17*	*8*	*9*	*0*	*0*	*0*	
Control	*28*	*3*	*2*	*1*	*0*	*0*	*0*	
Common Beans	**47**	**41**	**8**	**17**	**9**	**6**	**1**	**0.53**
Intervention	*33*	*24*	*3*	*11*	*5*	*4*	*1*	
Control	*14*	*17*	*5*	*6*	*4*	*2*	*0*	
Ground Beans	**79**	**9**	**5**	**2**	**1**	**0**	**1**	**0.93**
Intervention	*50*	*7*	*3*	*2*	*1*	*0*	*1*	
Control	*29*	*2*	*2*	*0*	*0*	*0*	*0*	
Cow peas	**87**	**1**	**0**	**1**	**0**	**0**	**0**	**1**
Intervention	*56*	*1*	*0*	*1*	*0*	*0*	*0*	
Control	*31*	0	*0*	*0*	*0*	*0*	*0*	
Overall	20	350	60	122	70	48	50	

[1] P-value for Fisher's Exact Test for difference between Intervention and Control.

Table 1b. Legume consumption in children in intervention and control households, as percentages.

Legume	Never	Ever	1/ month	2-3 /month	1-2/ week	3-5/ week	Every Day
Groundnuts							
Intervention	28%	72%	2%	28%	14%	18%	11%
Control	32%	68%	3%	29%	26%	0%	10%
Soya beans							
Intervention	39%	61%	5%	9%	11%	14%	23%
Control	77%	23%	6%	3%	10%	0%	3%
Pigeonpeas							
Intervention	70%	30%	14%	16%	0%	0%	0%
Control	90%	10%	6%	3%	0%	0%	0%
Common Beans							
Intervention	58%	42%	5%	19%	9%	7%	2%
Control	45%	55%	16%	19%	13%	6%	0%
Ground Beans							
Intervention	88%	12%	5%	4%	2%	0%	2%
Control	94%	6%	6%	0%	0%	0%	0%
Cow peas							
Intervention	98%	2%	0%	2%	0%	0%	0%
Control	100%	0%	0%	0%	0%	0%	0%

The results presented in Table 2 show the differences between intervention and control children's consumption of *any* type of legume. The intervention children ate legumes more than twice as often as the control children, and the intervention median was three-fold the control children. The difference between treatment and control was significant (p=.006), and there were no observed confounders or covariates.

Table 2. Frequency of Legume Consumption (any kind) in Days per Month

	N	Mean	SD	Min	25th	50th	75th	Max
				Percentiles				
All	**88**	**16.4**	**18**	**0**	**1**	**7.5**	**28.5**	**75**
Intervention	57	**20.1**	19.8	0	0	17	32	75
Control	31	**9.2**	11.7	0	1	6	9	47

Test for difference between frequency of consumption of legumes between Treatment and Control.

Model: Legume days per month = treatment + confounders/covariates + interaction,
$r^2 = 0.09$
$p = 0.0063$

There were no main effects or interactions of the following potential confounders and covariates: Mother's Age, Mother's Education, Mother's Main job, Child's age, Mother's perception of child growth, Number of meals child eats per day.

We also tested the model:
Number of meals per day = treatment.
There was no effect.

The question was raised if the effects observed in Table 2 were due, not to involvement in SFHC, but rather to simply receiving legume seeds. The numbers of control and intervention households that received seeds is shown in Table 3.

Table 3. Source of legume seeds of households within past three months.

	Control	**Intervention**
Number of households	31	57
receiving from		
SFHC	3	24
Micah	0	3
AidsOrphans	0	0
PHC Seed Mult	1	0
Cadecom	1	1
PHC Fertilizer	0	0
Plan	0	0
Don't know	0	1
CCAP Synod	0	1
Other	5	2
Did not receive	16	22*

* "Intervention" households that did not receive seeds in the past three months are households that received seeds from SFHC the previous year.

Column totals do not add up to 31 and 57 because some households received seeds from more than one source, and some households did not report that they "did not receive".

The effect of receiving seeds from different donors was then tested in a GLM, as explained and shown in Table 4. The results indicate that, while treatment (that is, participation in SFHC) had a strong effect, with SFHC children eating legumes more than twice as frequently as control children, it was not simply receiving seeds that mattered, but rather full involvement in the program, as neither "Other Seed Donor" nor "SFHC Seed Donor" had an effect on frequency of legume consumption.

Table 4. Treatment and source of legume seeds effects on frequency of child consumption of legumes.

General Linear Model:
Legume Days per Month = Treatment + Other Seed Donor + SFHC Seed Donor
where:
Legume Days per Month = continuous variable, n times child eats legumes/month
Treatment = fixed effect, binary variable, control vs intervention.
Other Seed Donor = fixed effect, binary variable, received vs did not receive seeds from sources other than SFHC in the last three months
SFHC Seed Donor = fixed effect, binary variable, received vs did not receive seeds from SFHC in the last three months

Source	DF	SS	MS	F	P
Model	3	2552.8	850.9	2.74	0.0486
Error	84	26128.6	311.1		
Corrected Total	87	28681.5	329.7		

R-square	Root MSE	Mean Legume Days Per Month
0.089	17.64	16.273

Source	DF	SS	MS	F	P
treatment	1	2153.9	2153.9	6.92	0.01
OtherSeedDonors	1	143.4	143.4	0.46	0.50
SFHCseeds	1	6.697	6.697	0.02	0.88

Least Squares Means (the mean after controlling for other effects in model)

treatment	LSMEAN
control	10.5
intervention	21.6

other seed donor?	
No	14.2
Yes	17.9

SFHC seed donor?	
No	15.7
Yes	16.4

Discussion

These are important, interesting and encouraging results. These are the first results we have indicating that the SFHC project is having a positive health impact. A doubling in average frequency of consumption is a marked and impressive result. The average SFHC child now eats legumes on two out of every three days, whereas the average control child eats legume on one out of every three days.

Equally important is that this effect appears to not simply be a function of receiving free legume seeds. One-third of control households report receiving legume seeds, but this did not translate to greater frequency of consumption. Also, receiving seeds from SFHC in the last three months was not an important predictor of legume consumption – indicating that, when SFHC participation is also considered, it does not matter whether the households received seeds in 2003 (new households), in 2002 (previously enrolled households), or not at all (the controls).

It is interesting to speculate what is the underlying cause of these results. If it is not merely access to seeds, then what is it? Note that the nutrition education program was not well developed at the time of these results, and we would hesitate to attribute differences in diet to this program. Rather, we believe that these results follow from the participatory methods and ecosystem approach that the project has embraced. The Farmer Research Team, from the beginning of the program, emphasized the linkages between agricultural production and child health outcomes; the use of legumes as a food source for young children was a primary reason cited for joining the project by many farmers.[1] Although a formal nutrition education program did not begin until 2003, the FRT actively promoted child nutrition as a project goal in farmer meetings, training and other project activities. In a review of the effects of agriculture interventions on nutrition outcomes, we concluded that interventions that invested broadly in five types of "Capital" (Natural, Human, Social, Physical, Financial), more often had positive nutrition impacts than did those interventions which did not invest broadly[2]. So rather than any one factor, such as free seeds, nascent nutrition education program, it may be the involvement of the households in a participatory project, with a wide range of Capital investments.

These changes, while exciting and important, are not, in themselves, sufficient. They are an indication of improved diet in participating households' children. We will continue to analyse the collected data and to examine in future surveys to quantify other indicators of health effects, including other diet changes, exclusive breastfeeding and anthropometrics.

[1] R. Bezner Kerr and Chirwa, M. (2004) Participatory research approaches and social dynamics that influence agricultural practices to improve child nutrition in Malawi. Ecohealth In Review.

[2] PR Berti, J Krasevec and S FitzGerald (2004) A review of the effectiveness of agriculture interventions in improving nutrition outcomes. Public Health Nutrition 7(5):599–609.

Appendix E: Report on changes in anthropometrics and hemoglobin in control and intervention villages.

Data Set: Four Anthro and Hb surveys.
Program: “all Anthros.sas”

Sample size: Varies from survey to the next. In total, there are anthropometric data from 1120 individuals.

Model: First, simple descriptive statistics and plots are used to describe the data. Then for testing for project effects, PROC MIXED in SAS was used. The height and weight z-scores were the dependent variables. Independent fixed variables were SFHC participation and sex. Dependent random variables were baseline z-score (to control for differences in size at baseline), age at baseline and age at endline (to control for the normal tendency of children 6 to 24 months to be most severely stunted and underweight and afterwards partly recover.

Results.
Quality of data:
We did not do formal testing of anthropometric error, with repeat measures one day apart, but proxy measures gives us confidence in the quality of the data. First, we do not expect maternal height to change over time, and it is a difficult anthropometric to collect accurately. We reason if the maternal height data appear well collected, than weight (which is relatively easy to collect), and child anthropometrics will also be well collected.

The correlations between measures of height in different surveys are reasonably high, as shown in Table 1 and depicted in Figure 1. Out of the 159 individuals measured in both March 2002 and March 2004, twelve may be considered outliers, and in error. Given that the data were collected by different teams in different locations two years apart, these results are quite good.

Another indication of accuracy is through the TEM (technical error of measurement). It is calculated as:

$$TEM = \sqrt{[(\sum d^2) / (2N)]}$$

That is, the squared root of the sum of the squared difference of replicate measures on the same subject divided by twice the number of pairs.[3]

TEM is usually calculated using paired measures done by the same team, separated by hours or days, not years. Still, the TEM of maternal height from our surveys is, as shown in Table 2, reasonably low.

Table 1. Pearson Correlation Coefficients between maternal height measured at two different surveys (March 2002, August 2002, January 2003, and March 2004). (Numbers represent r^2 and n.)

	Mar 02	**Aug 02**	**Jan 03**	**Mar 04**
Mar 02	1.00 (363)	0.94 (262)	0.96 (203)	0.90 (155)
Aug 02		1.00 (439)	0.96 (238)	0.95 (166)
Jan 03			1.00 (570)	0.94 (279)
Mar 04				1.00 (475)

Table 2. Technical error of Measurement (TEM) in maternal height in Ekwendeni surveys: March 2002 vs January 2003, and March 2002 vs March 2004.

Surveys	**N**	**TEM of height**	**Reference TEM**
Jan 03 - March 04	279	1.46	0.727
March 02 – March 04	155	1.75	0.727

The reference TEM is a typical TEM that may be expected if repeat measures are done by the same person within hours or days of the first measures. From Frisancho[3].

[3]Frisancho AR (1990) Anthropometric Standards for the Assessment of Growth and Nutritional Status. Ann Arbor: University of Michigan Press.

Finally, we note in Figure 2 that the average height is relatively constant, as is to be expected, but the average weight fluctuates in a manner that we may have predicted. The first survey (March 2002) is during a severe hungry season (see timeline in Introduction). The maternal weight is at a low at this time, and then some recovery occurs before the next survey, done post-harvest, Aug 2002. Their weight drops again during the next two hungry season surveys, but not as much as it was during the severe drought of 2002.

Hemoglobin levels were also measured during all four surveys. Correlation between measures is not necessary expected and there is no similar internal check for consistency that we can do. We do believe there were some methodological errors in the first three surveys, and we do not have a great deal of confidence in the data. Hemoglobin data reported below should be considered unreliable.

Figure 1.

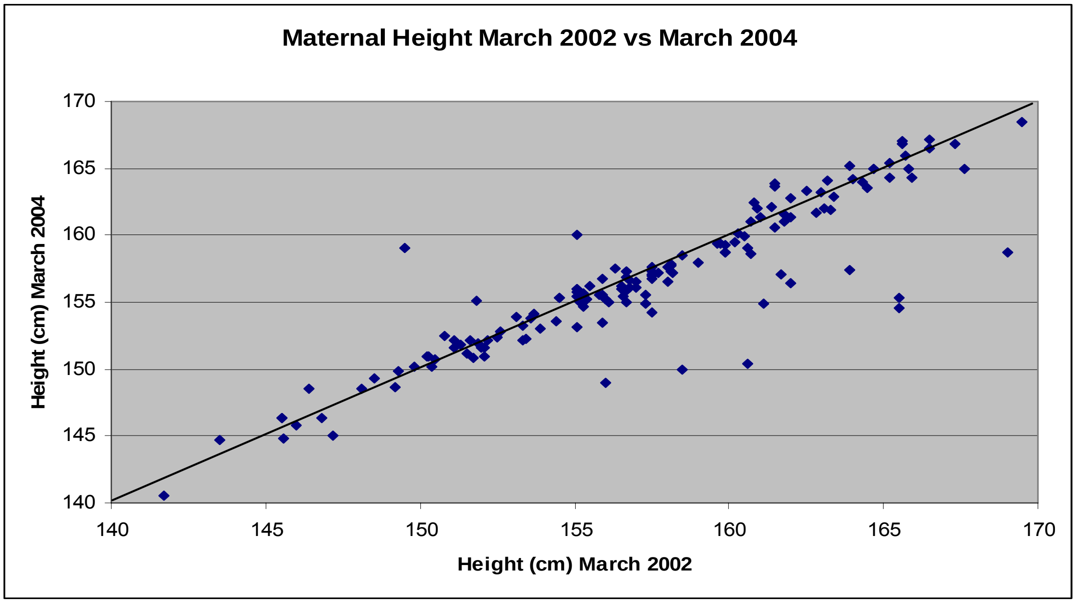
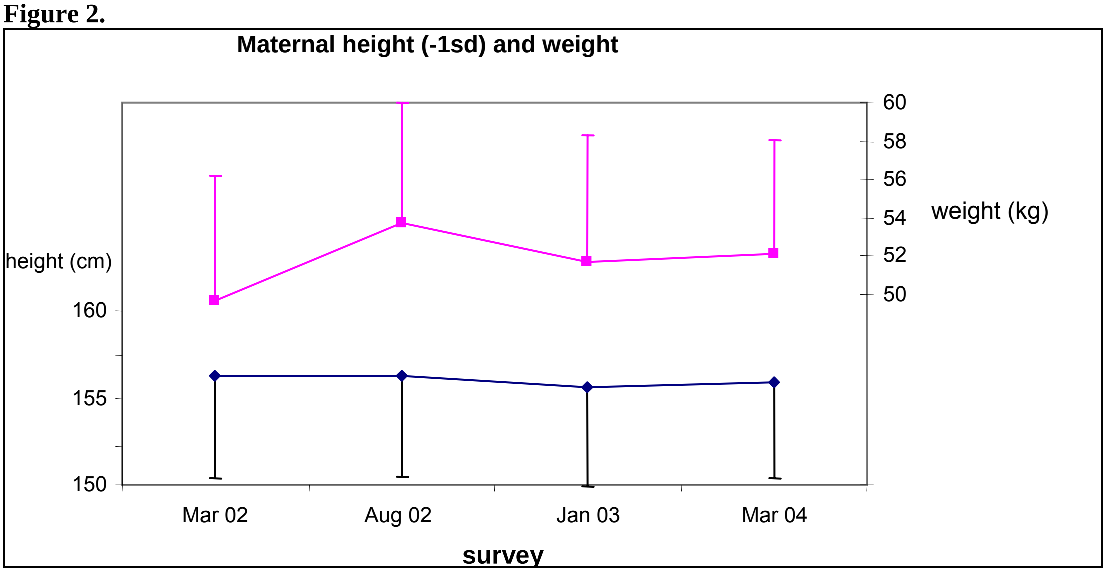


Figure 2.



Change in child anthropometrics: 2002 to 2004.

Changes in anthropometric status and hemoglobin levels are shown in Figures 3 and 4. Asterisks indicate significant differences (determined with a one-way ANOVA) between intervention and control groups at the time period.

Figure 3.

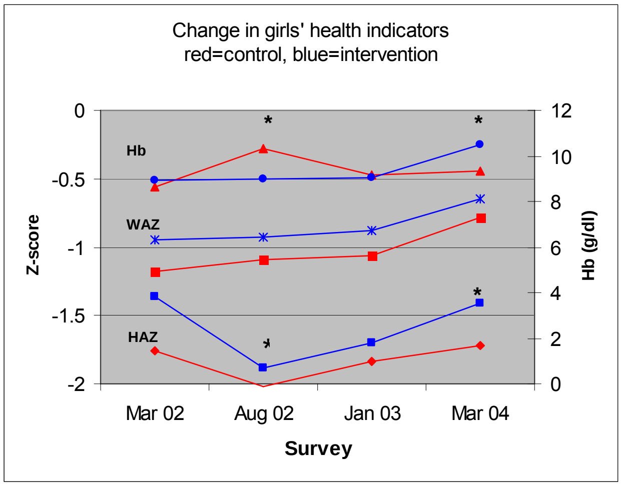
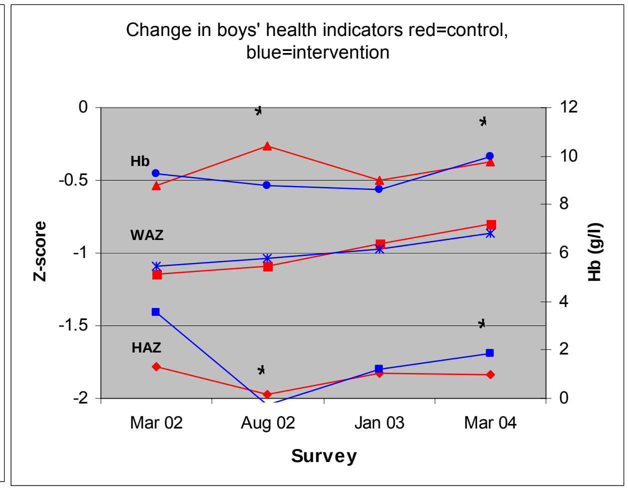


Figure 4.



However these analyses are rather crude. Of special interest is if there are differences between the control and intervention children, after various confounders are considered. Given the nature of the database, the nature of the intervention, and the number of possible confounders, this is a difficult analysis to conduct. The results presented below must be considered preliminary.

First Models:

Initially we tested the model:
Independent variables: HAZ (or WAZ) in Jan04
Dependent variables: participation in SFHC, HAZ (or WAZ) from an earlier survey (March 02, Aug 02, or Jan 03)
Run for each sex separately.
This was done in SAS using PROC GLM.

Results: For girls, but not for boys, participation in SFHC resulted in significantly better anthropometric status in January 2004, even after controlling for baseline status (where baseline is considered any of the three earlier surveys). The difference is 0.25 for HAZ and 0.30 for WAZ.

More developed models:

The next question then is if there are variables other than the participation in SFHC that may explain the differences between control and intervention groups. It may be that these differences are due to other between-group differences.
There is a tendency in developing countries for stunting to be worst around 12 or 18 months and then slowly recover. This is also the case in Ekwendeni (see Figures 5 (height for age) and 6 (weight for age)). Age differences between control and intervention groups could explain the growth differences. In fact, the average age of the control group in March 02 is about 2 months greater than the intervention group. By March 04, the intervention group is about 3 months older, due to differences in loss to follow-up and recruitment.

To test if the change in age is responsible, a new model was written and run in which:
Independent variables: HAZ (or WAZ) in Jan04
Dependent variables: participation in SFHC, HAZ (or WAZ) from Jan 03, age in Aug 2004
Run for each sex separately.

This was done in SAS using PROC GLM.

Results: Age in August 2004 accounts for the variability and participation in SFHC is not longer a significant predictor of HAZ or WAZ.

However, that is with PROC GLM in SAS, which is not the preferred way to handle mixed models (that is, models that have both fixed (participation in SFHC) and random (HAZ in Jan 03, age in Aug 04) independent variables). It is better to use PROC MIXED, which is specially designed for mixed models. However, MIXED is a complex procedure to run and even harder to interpret the results. In initial attempts we used a "repeat measure mixed model, with autoregressive covariance and quadratic model for time". In this analysis, treatment DOES have an effect, in girls only. This is still preliminary, as we can not be sure that the model has been run correctly.

Figure 5.

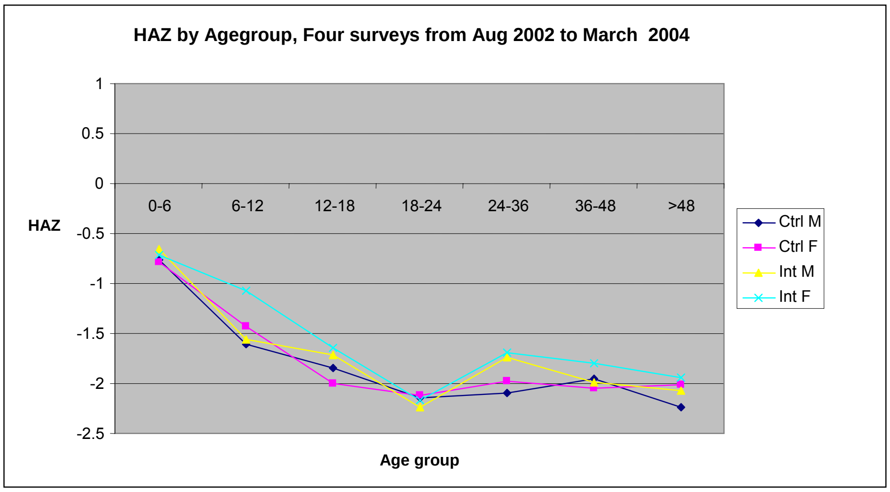
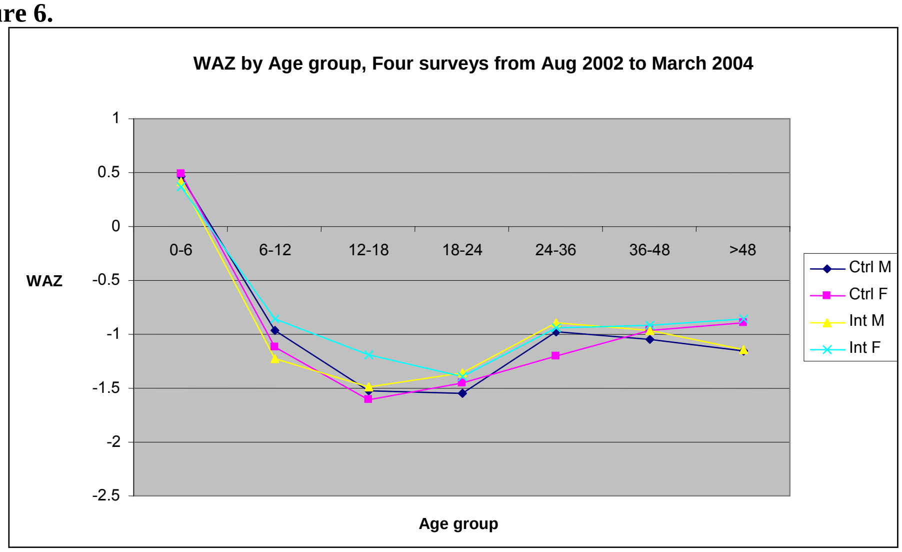


Figure 6.



Discussion:
There is a treatment effect, but we are still not certain if this is a function of a confounding variable (age) or is a true treatment effect. Analyses will continue in the coming months.

Appendix F: Report on results of OMT Experimental Plots.
Report on OMTs Experimental Plots.

6 June 2004.
SFHC Project, Ekwendeni.

SUMMARY
Trials were run in 2001-2 and 2002-3 in which the FRT's tried various legume options on experimental plots, approximately 100 m^2. In the first year of the trials (2001 and 2002) the farmers chose from a variety of legume options that were chosen for their potential to improve soil fertility. In the second year of the trials (2002 and 2003), the farmers planted maize and measured the yield. Overall, from this data, in contrast to the farmer's qualitative research, there were no differences in maize yield resulting from the previous year's treatment.

METHODS
A. 2001-2002:
- Ninety-eight farmers in seven villages, had one (n=67), two (n=23), three (n=5), four (n=1) or five (n=2) plots each, for a total of 142 plots.
- The farmers chose from six different legume options and planted them on plots of 40 m^2 (n=2), 50 m^2 (n=8), 100 m^2 (n=131), or 200 m^2 (n=1).
- Six different legume options, as well as a new, or control, options were selected as shown in the table below.
- Three different types of maize were used: masika (n=138 plots), local (n=3), MH18 (n=1).

Data were collected by the Farmer Research teams on plot size, the number of maize stalks, the weight of the stalks, the weight of the grain and the moisture content. The data can be analyzed in terms of dry or weight wet per square meter, and per stalk. However, there is little variation in moisture content by treatment, and so analyses were not done on dry weight basis.

B. 2002-2003:
- Thirty-four farmers in seven villages, had one plot each.
- The farmers chose from five different legume options; plot size data were not collected.
- Seven different legume options, were selected as shown in the table below.

Data were collected by the Farmer Research teams on the number of standing maize stalks, the number of fallen maize stalks, the weight of the stalks, and the weight of the grain. The data can be analyzed in terms of weight wet per stalk, but not per square meter, nor as dry weight, as moisture content and plot size data were not collected.

Legume Options	Number of Plots: 2001-2002	Number of Plots: 2002-2003	Number of Plots: Total
Soyabeans x pigeon peas	16	6	22
Tephrosia x maize	5	5	10
Macuna	27	7	34
Maize x pigeon peas	26	4	30
Groundnuts	4	-	4
Groundnuts x pigeon peas	56	10	66
New	8	-	8
Macuna x maize	-	1	1
Tephrosia x pigeon peas	-	1	1
TOTAL	142	34	176

The data were analyzed in SAS using Proc GLM, testing the models:
Y = treatment village .

Where Y is kg grain per plot, kg grain per stalk, number of stalks, kg of stalks, kg per stalk, on a wet and dry weight basis. "treatment" and "village" are main effects, representing the previous season's treatment and different villages .
The 2002-3 data were included only in the kg grain per stalk wet weight analysis.

RESULTS

2001-2002 Data:

1. Number of stalks per square meter:
There were no differences between treatments, but there were differences between villages ($p=.001$, $r^2=.23$), with village averages ranging from 1.6 to 2.7 stalks per square meter. The overall average was 1.85.
2. Kg stalks per square meter:
There were no differences between treatments, but there was weak evidence of differences between villages ($p=.1$, $r^2=.14$), with village averages ranging from 0.13 to 0.22 kg stalks per square meter. The overall average was 0.17.
3. Kg grain per square meter:
There were no differences between treatments or villages ($p=.2$). The overall average was 0.13 kg of grain/m^2.
4. Kg grain per stalk:
There were no differences between treatments, but there were differences between villages ($p=.004$, $r^2=.15$), with village averages ranging from 0.05 to 0.11 kg grain per stalk. The overall average was 0.09.
5. Kg per stalk:
There were no differences between treatments, but there were differences between villages ($p=.02$, $r^2=.13$), with village averages ranging from 0.07 to 0.15 kg per stalk. The overall average was 0.12.

Tests were also done on comparing the productivity of the plots to the number of plots a farmer had, as a proxy measure of farmer enthusiasm for OMTs. There was no effect.

2001-2002 and 2002-2003 Data:

1. Kg grain per stalk: The only additional meaningful analysis that could be done with the merged data sets is kg of grain per stalk. There was still no treatment effect, and the village effect remained ($p=.037$, $r^2=.15$), with village averages ranging from 0.05 to 0.12 kg grain per stalk. The overall average was 0.09.

CONCLUSIONS:
The initial impression is that these are discouraging results, with no treatment effect. But there was a significant flaw in the study execution, as there were no control plots, contrary to the planned design. All treatments may be having significant, but equivalent, effects. The grain yield of 0.13 kg of grain/m^2, or 1.3 MT per Ha is low to average yields of maize grown without inputs across the country, which one study reported at 1.4 kg ha^{-1}.[4] However national-level yields would include a large variation in soil fertility and management. The results are comparable to other studies with resource-poor farmer trials in Malawi, and suggest that the legumes are improving yields compared to maize grown without inputs. One study found that maize grown without inputs by resource-poor farmers had an average yield of 750 kg ha^{-1}.[5] Another study reported average yields of 900 kg ha^{-1}.[6] Farmers in our study reported improved maize yields after legume crop residue incorporation, but we are unable to verify their observations due to a lack of control plots. These results do not lessen our confidence in legume systems, although the results (and lack of control group) are disappointing and are a lesson for future studies.

---

[4] Jones, R., & Wendt, J. W. (1994) Contribution of soil fertility research to improved maize production by smallholders in eastern and southern Africa. In D.C. Jewell, S. Waddington, J.K. Ransom, & K.V. Pixley, Eds. Maize Research for Stress Environments: Proceedings of the 4th Eastern and Southern Africa Regional Maize Conference. CIMMYT, Harare, Zimbabwe.
[5] Snapp, S., Kanyama, P. G. Y., Kamanga, B., Gilbert, R., & Wellard, K. (2002) Farmer and researcher partnerships in Malawi: developing soil fertility technologies for the near-term and far-term. Experimental Agriculture 38: 411-431.
[6] Orr, A., Mwale, B., Ritchie, J. M., Lawson-McDowall, J., & Chanika, C. S. M. (2000) Learning and Livelihoods: The Experience of FSIPM in Southern Malawi. Natural Resources Institute, Chatham, U.K.

Appendix G. The activities of Rachel Bezner Kerr carried out for SFHC during 2003-2004

1. Attended different recipe days, workshops and consultations and provided technical and social science input to the nutrition education program (see Appendices 1-2)
2. Helped the nutrition promoter develop lesson plans (Example provided in Appendix 3)
3. Attended agricultural training, workshops and meetings of the project and provided technical and social science input to the program (Appendix 4)
4. Met with different donors and international researchers on behalf of the program to facilitate exchange of ideas e.g. IITA, ICRISAT, USC
5. Helped the SFHC team draft and revise proposals for funding
6. Provided qualitative research training including carrying out interviews, writing field notes, analysing data and writing qualitative reports
7. Coordinated and carried out qualitative research with the rest of the SFHC team on ‘root water’ and ‘crop residue incorporation’ (Reports will be sent by Ekwendeni PHC but have received considerable input from Rachel).
8. Coordinated and facilitated a community seed workshop to determine the future plans for seed production and distribution within the Ekwendeni catchment area (Appendix 4-6)
9. Provided support and advice to Marko Chirwa on how to write academic papers for the submission of the paper to the journal *Ecohealth*
10. Coordinated and accompanied Marko Chirwa on a two-week visit to Canada and the United States after the Ecohealth Forum in Montreal. During this visit he met with farmer organizations, NGOs, university professors and donors. He also gave a presentation about the project at Cornell University.
11. Provided capacity building to project staff on organizational skills and planning.
12. Helped to coordinate and provided advice and support for staff on SFHC planning meetings including staff meetings and annual strategic planning meetings.
13. Provided advice and support to the co-op student from the University of Toronto on research and project activities
14. Provided training and support to staff on computer use
15. Helped with purchase of seeds by driving to Lilongwe to collect it.

Dissertation Research:

Rachel also carried out her dissertation fieldwork during this year. Her research focused on the factors that affect farmer access to maize and groundnut seed in northern Malawi. One-third of my research was qualitative research based in villages, one-third was institutional interviews, and one-third was archival research. The first two aspects (village-level and institutional) were carried out in collaboration with the SFHC team, and had direct relevance for the project. Some of the initial findings were reported at the Community Seed Workshop in May 2004 (see Appendix 7)

Appendix H. Proposal to CSIH for "NetCorps Intern" (accepted).

PATH Canada has successfully applied for two previous internships to help out on the SFHC project. The contributions of Tanya Trevors and David Ryan were very valuable to the project. We have now applied for and received another internship, through CSIH's NetCorp program. We had a number of good applicants. The successful applicant is Laura Sikstrom. She has an educational background in anthropology, and significant IT work experience. She will work in Ekwendeni from October 2004 through March 2005. Relevant excerpts from our proposal are shown below.

Sarah Brown, Program Coordinator
International Health Youth Internships Program
Canadian Society for International Health
One Nicholas Street, Suite 1105
Ottawa, Ontario K1N 7B7 Canada
Fax: (613) 241-3845
E-mail: sarahb@csih.org

15 December 2003

RE: Proposal to host a CSIH/NetCorps intern in 2004-2005

Dear Sarah,

In partnership with Ekwendeni Hospital, PATH Canada has a very exciting project entitled "Soils, Food and Healthy Communities", in which we are linking agriculture and nutrition research and development activities to improve food security in Ekwendeni, northern Malawi. We are submitting this proposal to CSIH for hosting an IT intern in this project. The project is "data rich" and will be challenging and interesting to a young person with a mind for data management and a heart for development. We look forward to finding the right intern, contributing to their training, and sharing with them in the project's progress.

The project has already hosted two CSIH interns (Tanya Trevors and David Ryan), and it was a positive experience for all sides. We look forward to more of the same with this proposal.

Please contact me if you have any questions.

Best regards,

Peter R. Berti, PhD
Nutrition Advisor
PATH Canada
One Nicholas St., Suite 1105
Ottawa, Ontario
K1N 7B7
tel: 613-241-3927 x.324
fax: 613-241-7988
pberti@pathcanada.org
www.pathcanada.org

2. Job Title for Intern

"Data Manager" for Ekwendeni Hospital/PATH Canada project: "Soils, Foods, and Healthy Communities" based in Malawi.

11.2 Job description: Outline the responsibilities and activities of the young professional during both the Canadian and overseas components of the internship

In the course of the research, the project has collected vast amounts of data through qualitative research, participatory action research activities and four surveys. Much of the data has been entered by project staff, although much remains to be entered, and still more will be collected. The data manager will assist with the development of data entry templates (in EpiInfo), verify the accuracy of data entered by project staff and rectify as necessary, develop and implement linkages between the various data sets. Whenever possible, the intern will work to develop the skills of the project staff in data management and analysis.
As time allows, if the intern has the skills they may also work on: general maintenance of the project's computers; development of project website; support of hospital telecommunications.

12. Qualifications Required: Indicate the education, experience, language skills (spoken and written), technical and other skills you will be looking for in a candidate to fill this position. Specify particular computer programs a successful candidate must be familiar with.

- *Education and Experience:* There are no specific education or experience requirements, recognizing that the requisite skills could be obtained in numerous ways.
- *Language:* English fluency is required.
- *Computer Skills:* A high-level of proficiency with PCs is required. The intern will be expected to use, at least, EpiInfo, Access, and the MS Office suite. Experience with EpiInfo is not required, as it is not difficult to learn by someone with experience in other databases; therefore proficiency in at least one database software is required. Proficiency with SAS is desirable, but not required. Experience in conversion of data between software file formats is desirable.
- *Other Skills:* Team player and cross-cultural sensitivity is required. Experience in any of statistics, nutrition, agriculture, or participatory research is desirable.

13. Development Results: How will the internship increase the capacity of your organization in information communications technology? With what benefits to the host country? How will the capacity be maintained after the intern has left?

The skills that we are searching for in this internship are uncommon among organizations in international development. Having an intern with similar skills to the mentor (Peter Berti) will increase our reach in making this unusual but important contribution.
The host organization has a great need for assistance with management of the project data: it is not until the data are organized and analyzed that all the lessons of the project will be learned, and the maximum development impact can be effected.
The intern will build the capacity of the project staff in data management and analysis. In particular, the intern will work with the project data entry clerk, Jonah Sinyanga, who with adequate training and experience has the potential to be a future data manager.