Final Technical Report to IDRC

Project Title: Soils, Food and Healthy Communities, Malawi Phase II: A Participatory Agroecosystem approach to Monitoring Change in Northern Malawi

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Synthesis:

The second phase of the SFHC project built on accumulated knowledge from the initial phase of the project, working to improve food security, child nutrition and gender relations, through an intensification of the project’s legume-based agriculture intervention throughout the entire area. The overall objective of this phase of the project was to improve child nutrition and household food security for resource-poor farmers through increased use of legumes in the Ekwendeni catchment area. Sub-objectives were 1) to increase knowledge about legumes options and seed multiplication; 2) to develop a community-based participatory nutrition education program that integrates agricultural and household issues and includes all members of the family that influence child nutrition; 3) to develop a sustainable source of legume seed in the region; 4) to improve access to legumes for orphans and food insecure children attending the Village Nursery Schools; and 5) to foster community leadership that addresses the needs of food insecure households knowledge in the region.

The research questions focused on the effect of the nutrition education and legumes on soil fertility, food security and child health. The overall project research question, building on the research carried out in the first phase, was: Do these legume options improve child nutritional status? Sub-questions related to improvements in food security, gender relations, child feeding practices and soil fertility. The project also examined whether farmers could organize to solve multiple problems, and to improve seed access. To address these questions, the project examined the changes in child nutrition, soil fertility, food security, child feeding practices, gender relations and farmer organization according to degree of adoption of the legume-based agriculture practices, at baseline, and periodically throughout the intervention period.

There has been high uptake of legumes throughout the Ekwendeni area during this phase, which has pointed to the success of the project in improving seed access and dietary diversity, but has also made it difficult to assess effects due to loss of or 'contaminated' control villages.

This phase involved the successful development of a community-based legume seed production system, through the work of the Farmer Research Team and a Community Legume Seed Bank. Participating farmers formed the “Ekwendeni Farmer Association” which works to promote soil fertility, food security and child nutrition through legume production. This association has successfully marketed their legumes locally for two years. Evidence from our research suggests that there is an expansion in legume production throughout the catchment area, and that farmers are sharing seed with non-project farmers.

Farmers feel that participation in the project has improved their food security through crop diversification and reduction in fertilizer costs. Many also cited learning new food processing techniques and recipes through the participatory discussion groups and the recipe days. Farmers have also responded positively to the efforts at promoting legumes as a source of soil fertility, with significant changes in the number of farmers incorporating legume residue into the soil. However the farmers have noted that it takes several years to obtain significant changes in soil quality and crop yields with legume residues.
The Agriculture and Nutrition Discussion Groups had high participation from villagers, who indicated in a qualitative evaluation that these groups provided an opportunity for the sharing of ideas, brainstorming and problem-solving. Farmers learned new ways of storing seed, looking after children and working in families. Qualitative evidence suggests that the work of the ANDGs and the FRT have had positive effects on spousal relations, including household decision-making about resources, and the division of labour. Participating households highlight this method primarily as an opportunity to share ideas and discuss problems.

Two areas which have not been adequately addressed to date are: 1) whether the legume options and nutrition education have improved child nutrition and 2) whether harmful feeding practices, particularly early introduction of non-breastmilk in the first 6 months, have been reduced. The first question is still being analysed by our team, and results will be included in the Healthbridge final report. The second question has proven difficult to answer in the context of hospital policy and villager perception, and would require an ‘outsider’ to answer. A final intervention which was not successful was legume production with Village Nursery Schools, due to conflicts between hospital volunteer committees over responsibility for the group legume plots for the nursery schools.

Research problem

The overall project research question is: Do the legume options improve child nutritional status? There were also numerous sub-questions about the effects of and interactions between intercropping legumes on food security, gender relations, child feeding practices, soil fertility outcomes and social learning. Qualitative interviews, focus groups, anthropometry measurements and two surveys were conducted, along with annual field visits. Students were involved in the research, and staff also enhanced their research capacity during this phase. Research questions were posed in relation to three major ‘themes’, the first two which had both research and development activities:

Theme I. Sustainable Community-Based Legume Promotion

The SFHC project identified five legume options to improve soil fertility, based on advice from the Ministry of Agriculture and ICRISAT (International Crops Research in the Semi-Arid Tropics). These options are: 1) pigeonpea and groundnut intercropped; 2) pigeonpea and soyabean intercropped; 3) maize and pigeonpea intercropped; 4) Tephrosia voglii and 5) Mucuna spp. The first phase of the project suggested that the first and second options were the most popular choice, since the edible legumes could be consumed, while the fifth option was considered most effective at improving soil fertility. The project has been highly successful in promoting legumes throughout the catchment area. As of 2007, over 5000 farmers had joined the project to test legumes on their farms, in over 100 villages.

Research from phase I indicated that many households did not receive enough initial seed to retain the seed in times of food shortages. Findings from 2004, indicated that seventy-three percent of farmers who joined the project in the first two years maintained their legume seed at pilot production levels (less than 400m² plots), while 14% expanded their legume production by up to 100-fold. Thirteen percent stopped growing at least one legume crop, due to consumption of seeds (particularly after the drought and famine of
2002), labour shortages, disinterest, illness and other factors. Many ate their seed stocks prior to the rainy season, typically the most food insecure, new migrants to the region (known as tenants) and AIDS-affected households. In addition, households with labour shortages (e.g., AIDS affected) often had conflicts between health problems and farming during the rainy season. An illness within the extended family could mean the loss of a variety or an entire crop for many years, due to time taken away from farming. Many food-insecure farmers relied on seed sold in local markets, which tends to be of lower quality and of unknown origin. These findings supported research findings in other parts of Eastern Africa which indicate that poorer families with fewer social ties rely more heavily on purchase of seed stock, often at times when seed prices are high and are vulnerable to seed loss (Sperling and Loevinschi 1993; Sperling, Loevinschi et al. 1993; Sperling, Scheidegger et al. 1996; David and Sperling 1999) Finally, 19 out of 21 farmers interviewed in 2004 had given away legume seeds so that the legume seeds were spontaneously spreading throughout the catchment area and beyond. Our findings as of 2004 suggested that, despite this seed sharing, individual plot expansion of legumes was limited, and the legumes were not being used to improve soil fertility, but were being used primarily as a food crop. During Phase II, we examined whether the legumes were being used successfully to promote soil fertility, reasons for adoption and spread of the technologies, and the role that the participatory approach used in the research has played in the spread of the legumes.

In Phase I, the SFHC research team carried out agronomic research that suggested that many farmers who have been involved with the project from the beginning were not burying the crop residues, a practice that is essential for improving soil fertility. Labour shortages due to high levels of illness and food insecurity were one reason for not doing the practice, but this issue had not been explored fully. Farmers noted that regular visits from project staff and FRT members with reminders of the importance of crop residue incorporation were also important for maintaining good agronomic practices in the villages in the first two years of the program.

Research Objectives
1. To improve our understanding of the farmer motivations for adopting and maintaining legume options.
2. To improve our understanding of the spread (or failure to spread) of each legume option.
3. To examine the relationship between adoption and spread of legume options and child health.
4. To understand farmer perceptions and reasons related to the incorporation of crop residue.

Theme II: Agriculture and Nutrition Clubs and Village Nursery Schools

Malnutrition is widespread in the project area. Despite improvements during the first three years of the project, the anthropometric survey at the beginning of Phase II, in January 2004, indicated that 42% of boys (n=232) and 38% of girls (n=259) were stunted (height for age Z-score < -2). During this phase we published some of the widespread harmful feeding practices used by villagers, most notably the limited practice of exclusive breastfeeding and poor quality complementary foods (see Appendix 1, Food and Nutrition Journal article). Qualitative research on child care and feeding practices in the first phase identified the important role that paternal grandmothers have over decisions related to child care and feeding. For example, grandmothers encourage the
use of different infusions ("teas") to young children to "protect" and "strengthen" them. They also encourage the very early introduction of watery porridge to young children (see Appendix 3, Social Science and Medicine article). Using the findings from this qualitative research, surveys conducted in March and August 2002 found very low rates of exclusive breastfeeding and high incidences of diarrhea and we found a significant relationship between diarrhea incidence and the giving of root water. (see previously submitted internal project report "Relationship between Early Introduction of Foods and Diarrhea in Ekwendeni"). We also found a significant relationship between child growth and early introduction of watery porridge (see Appendix 1). The surveys also supported the qualitative findings that grandmothers were the primary decision-makers in giving root water to young children, while mothers were choosing to give watery porridge to their children. These findings indicated the limited success of the hospital's efforts to encourage exclusive breastfeeding, and the type of redirection that the exclusive breastfeeding promotion efforts required. Changing these behaviours using a participatory educational approach was a key goal of SFHC for Phase II.

Gender relations were a key area of conflict identified in the qualitative research. Although legume production increased, men often sold them and used the money to buy non-beneficial items such as alcohol. In addition, we found that men did occasionally help to feed young children as part of their household responsibilities. However, some grandmothers and men were resistant to men becoming more involved in child care.

A nutrition education program was initiated in 2003, after initial findings were presented to the villages. A Nutrition Team of 35 people was formed in the initial seven pilot villages. The nutrition education program focused on several areas: promotion of exclusive breastfeeding, encouraging legumes in the diet of young children, increased frequency of child feeding, encouraging men to be involved in child care and feeding, and dietary diversification. The team attempted to promote different child feeding recommendations through home visits, dramas, recipe days and 'informal chatting' at various places. However, we decided in Phase II to take a different approach to nutrition education, in part because of the expansion of the project into new areas, and the need for focused discussions on sensitive topics such as gender relations. Initial experience from our efforts at participatory nutrition education program and follow-up qualitative research conducted in 2004 suggested that many community members were resistant to the idea of men being more involved in child care and feeding, and to the suggestion that root water should not be given to young children. Many villagers felt that they could not produce enough breastmilk. Furthermore, mixed groups (age and sex) did not facilitate open discussions of these issues, due to the power dynamics at play between generations and sexes in this culture.

Our research also indicated that knowledge about child care and feeding practices in the communities was passed typically through women in informal settings, such as the maize mill or water collection points. Older women were considered to be key sources of knowledge; younger women were often discounted as being too inexperienced to advise others about child care and feeding practices. Men also influenced decisions made about child care and feeding. There have been very few attempts to involve grandmothers in nutrition education programs; typically the mother and occasionally the father is the target of interventions (Aubel 2001), rarely, if ever, the grandfather. The hospital has promoted exclusive breastfeeding throughout the catchment area, largely through group discussions, breastfeeding support groups for mothers, and formal presentations. This project took a unique approach by trying to involve all adult decision-
makers that are involved in child care and feeding in the nutrition education, and by linking agricultural practices with child nutritional outcomes, as described below.

The project formed research and discussion groups, called Agriculture and Nutrition Discussion Groups or ANDGs. The ANDGs are an educational approach that integrate agriculture, health, gender and social relations. We used a dialogue-approach to solving sensitive conflicts around child nutrition, drawing on educational theories about social learning in which reflection, learning from doing and discussion helps to foster long-term changes (Mezirow, 2000; Aubel et al., 2004). While focusing on sharing ideas and problem-solving, the project drew some key findings from our ongoing research, such as the effects of early introduction of non-breast milk foods to infants, into the discussion groups. Community members were self-selected to join the ANDGs from three village areas per year. Each village area ran the groups for a year. Within each discussion group there were four sub-groups of approximately 20 members, all of whom were involved with caring for young children: a) young mothers; b) young fathers; c) grandmothers and d) grandfathers. Each group met monthly and carried out participatory, problem-solving on different agricultural and nutritional themes which were developed by the Farmer Research Team and staff. The groups concluded with a shared meal and wrap-up of the discussions with all ANDG members. The facilitators were selected by group members and were already active members of the SFHC project. They received one week of training on participatory facilitation skills.

The ANDGs were an active attempt to link agricultural and nutritional issues in a holistic way in the project activities. The discussion groups attempted to increase and diversify production and the availability of quality foods. It was hoped that child health would improve through increasing knowledge of complementary foods, working to change household power dynamics. Furthermore, it was hoped that learning achieved in the ANDGs would be spread to other households through the ‘informal chatting’ already found to be a key source of information for villagers. The ANDGs also offered a research opportunity for the project to assess whether increased agricultural production and nutrition education are more effective at improving child growth, compared to increased agricultural production alone.

Tracking child health over time allowed us to answer the research question: ”Do legume options improve child nutritional status?” This design does not inform us about which particular aspects of the SFHC or the ANDGs were responsible for the improved child health. Our position, based on review of the literature, is that no single feature would be responsible for positive health changes, but rather the broad-based, participatory nature of the interventions collectively lead to improved health.

Research findings
Between December 2004 and February 2008, the Ekwendeni Soils Food and Healthy Communities project conducted fourteen different research activities, including anthropometry, focus groups, in-depth interviews and two major surveys. Research methods used included interviews and participatory approaches with problem-solving techniques, as such focus group discussions. We also used participatory evaluation in analyzing farmer trials like cowpea soya bean trials to see which ones can suit the farmers environment. We have used surveys and measured anthropometry to see changes in child health. The Farmer Research Team has collected data on field
expansion and crop residue incorporation. SFHC has used wealth ranking in
categorizing the communities in order to identify poor farmers as project beneficiaries.
Many of the results are summarized in the appendices included in this report, but are
summarized briefly below:

**Effects of SFHC/ANDG on Child Nutrition and Feeding Practices**

There appears to be a positive effect of the use of legumes on child nutritional status, as
measured through anthropometry. These data are still being analysed by Peter Bertl and
Rachel Bezner Kerr as of the submission of this report, and will be included in the
Healthbridge final report.

Qualitative data collected by SFHC staff suggest that farming households feel strongly
that involvement in the project has improved their children’s health and nutritional status
(Appendices 1, 6, 7 and 10). They largely attribute this improvement to changes in their
feeding practices, particularly giving porridge with added legume flour to young children.
Several respondents named specific children who had been malnourished, and who had
improved after being fed porridge and other project foods (Appendix 10). Respondents
also indicated that they learned new recipes to feed to young children, and they learned
healthy child feeding practices, such as frequent feeding which they felt improved their
childrens’ nutrition (Appendices 6, 7 and 10).

During the first phase, we found evidence from August 2002 survey data that children in
project households were fed legumes (groundnuts and soyabeans) significantly more
frequently than children in non-project households. In August 2005 we repeated this
measure, and found that consumption of legumes had increased in both intervention and
non-intervention households, and that there was no significant differences between the
two groups (Appendix 9). One explanation for this finding is that, the legumes have been
shared with non-project households. Previous research in Phase I indicated that farmers
shared a considerable amount of their seeds with others, so this explanation seems
plausible but has not been tested.

**Effects of SFHC/ANDG on Food Security**

Qualitative evidence indicates that farmers feel strongly that their food security status
has improved with their involvement in both the SFHC more broadly, and the ANDGs
specifically. Research conducted by a Canadian intern, Franziska Satzinger, and by
project researchers Lizzie Shumba and Rachel Bezner Kerr provide evidence that
farmers have diversified their crops, grow more legumes than previously, increased
maize yields, reduce fertilizer application, and their food supplies last longer than before
they joined the project. Respondents also indicate that they have more knowledge that
helps them improve their food security, such as food options during the hungry season,
and effective, inexpensive crop storage methods (Appendices 7 and 10). Farmers have
indicated that it takes several years before these changes are felt, since it takes time to
improve the soils, increase legume production and see changes in maize yields.

We have not successfully collected quantitative data on food security to date. We
collected yield data for 2 years (2006 and 2007), but discovered in 2008 that we had
carried out this process incorrectly.\textsuperscript{1} We have gathered qualitative data in 2007 about perceptions of food insecurity, based on a measurement tool developed by USAID.\textsuperscript{2} We are repeating this assessment in 2008, and hope to have some measure of quantitative changes in food security in the coming months.

**Effects of SFHC/ANDG on Improved Agricultural Practices and Soil Fertility**

Data collected by the Farmer Research Team in 2005 and 2006 show statistically significant increases in legume production and crop residue incorporation (Appendix 2). Farmers also noted improvements in the soil quality, and in maize yields in those fields where legume residue had been incorporated (Appendix 10). All farmers interviewed in 2007 who had incorporated legume residue also noted positive improvements in their food security, which they attributed to an increase in legume production and crop residue incorporation (Appendix 10).

In 2007 we began a collaboration with the University of Malawi, Michigan State University to carry out agronomic research on the legume options most often chosen by farmers. A Malawian PhD student, Wezi Mhango, who is doing her doctoral degree in soil science at Michigan State University, has begun agronomic trials in Ekwendeni and Kasungu to assess the effects of the legume options on nitrogen and phosphorus availability. This collaborative research project, funded by the McKnight Foundation, also entails some sharing of SFHC findings with farmers in Kasungu. We had hoped to use maize colour again to assess improvements in soil fertility, as this was an important local indicator. In 2007 we gathered maize colour data with intention to assess soil fertility effects from legume incorporation. However, we have learned from Dr. Kanyama-Phiri that in order to do so, we would require the same planting date, maize seed variety and we would need to assess maize colour on the same day. We do not currently have additional funds to carry out this assessment, but hope to do so through our collaboration with the University of Malawi.

**Effect of SFHC/ANDG on Gender Relations**

Qualitative evidence from focus groups, interviews and observation suggest that there has been an improvement in gender relations as a result of project implementation (see Appendices 4, 6 and 9). Respondents report that men are more often involved in child care and feeding than in the past, and that there is more equal decision-making between men and women about the use of household resources. Men also reported that they tried to discuss household problems more often with their wives, and reduced drinking. There was also more reported sharing of food within the family, particularly of more prestige foods such as meat. Within the project activities, men have become increasingly involved in the recipe days and other activities focused on improving child nutrition. Women are also actively involved in the leadership of the FRT. While these

\textsuperscript{1} We gathered harvested crops (maize, legumes) from a 10 x 10 plot area, but the farmers piled harvested crops into this same area, thereby inflating our yield data. This coming season we will stake out the yield assessment area in the pre-harvest period, to avoid this error.

relationships can be very difficult to assess, evidence from focus groups, interviews and observations in the villages provide some tangible proof that changes have occurred.

**Effect of SFHC on Farmer Capacity**

As evidenced from the active participation of the FRT in research activities and project implementation, as well as the dramatic rise in participation in the last 3 years (Figure 1), there has been a considerable strengthening of farmer capacity, both in terms of research and community organizing. The formation of the Farmer Association and the Community Legume Seed Bank (see below, under project implementation) also provides tangible evidence that farmers are better organized and able to address some of their problems.

**Development of a Participatory Educational Approach for Agriculture and Nutrition**

We have developed and successfully implemented an innovative approach to integrating agricultural, nutritional and social issues in an inter-generational educational program, which we have called the "Agriculture and Nutrition Discussion Groups". Our research indicates that this educational approach is very positively assessed by farmers, who appreciate the opportunity to share knowledge and ideas with one another (see appendices 6 and 7). Further description of the ANDGs is below.

**Figure 1: Number of Participating Farmers**, 2000 – 2007

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3 A participating household is one which joins the project, receives a small amount of legume seed of their choice and some training on legume utilization and project goals. These data were collected annually during seed distribution.
Fulfillment of objectives

The overall objective of this phase of the project was to **improve child nutrition and household food security for resource-poor farmers through increased use of legumes in the Ekwendeni catchment area**.

Sub-objectives were
1) to increase knowledge about legumes options and seed multiplication;
2) to develop a community-based participatory nutrition education program that integrates agricultural and household issues and includes all members of the family that influence child nutrition;
3) to develop a sustainable source of legume seed in the region;
4) to improve access to legumes for orphans and food insecure children attending the Village Nursery Schools; and
5) to foster community leadership that addresses the needs of food insecure households knowledge in the region.

As noted above, the overall objective has been partially fulfilled. We have documented an increase in legume production and crop residue incorporation. Farmers have reported improvements in food security and child nutrition. However, we do not have adequate evidence to back these claims. In terms of the sub-objectives, objectives 1, 2, 3, and 5 have been fulfilled, as discussed in other sections of the report (see Research Findings and Project Implementation). However, the fourth objective was not fulfilled, as discussed below under implementation.

Project design and implementation

**Management**
The project has run from December 2004-December 2007 with much involvement by FRT members, which is a volunteer led group which has strong leadership and takes a leading role in carrying out project activities. The activities that the FRT does include: holding FRT meetings and training new project beneficiaries on project objectives and legume planting patterns, helping in carrying out community surveys and questionnaires (anthropometry, agricultural), crop residue data collection, yield data assessment, legume expansion data collection recipe day training and nutrition education.

Partnerships with the University of Malawi, HealthBridge Canada and the University of Western Ontario has increased the capacity of SFHC staff in carrying out research work. We receive technical support and training from Rachel Bezner Kerr and Peter Berti, while our collaboration with the University of Malawi has allowed us to scale up the project and conduct agronomic research. We also have partnerships with Presbyterian World Service & Development, who provide financial support. We have also collaborated with other developmental organizations through exchanges and visits where we learn from one another, for example, we visited Concern Universal and learned about community seed banks.

**Design and Implementation**
Theme I: Sustainable Community-Based Legume Promotion.
**Legume Seed Multiplication**

In the first phase of the SFHC project, participatory research identified legume options that were the most useful for improving soil fertility, food security and child nutrition. In the second phase, the promotion of the correct use of these OMTs was intensified. A quantity of seeds, sufficient to plant one acre of legumes, was distributed to 480 participating project farmers, who were trained in seed multiplication, storage and selection by SFHC staff. While the original number of seed multipliers in the proposal was 60, we increased the numbers based on feedback during farmer workshops. There was tremendous increase in legume production throughout the catchment area, and due to this demand, we decided to increase the number of seed multipliers. We also wanted to have seed multipliers throughout the catchment area in order to increase seed access throughout the catchment area. These seed multipliers were selected by the Farmer Research Team and project staff based on their farming abilities, interest and land availability. The 480 farmers (from 8 village areas) returned double the amount of seed the following year to the Ekwendeni Community Seed Bank. The payback was 100%.

This seed was stored in the Ekwendeni Community Seed Bank, which was constructed from funds contributed by the Canadian Food Grains Bank in 2005. The Farmer Research Team manages this Seed Bank, including hiring a watchman to protect the seed. A Seed Bank Committee was formed by the Farmer Research Team. This seed was then distributed to new farmers the next growing season, who also had to pay back double their original seed 'loan'. This system was developed using research carried out on seed access at the household and community level, and after a community seed workshop with input from farmers, village leaders, staff and organizations that have carried out community seed programs. Selection of seed recipients was based on the following criteria: active interest in project objectives, food insecurity (based on Food Security ranking conducted in the villages) and a reputation as an active farmer. The approximate percentage of women recipients was 70%. In the proposal we indicated 80%.

The payback from these seed loans was ~95%, with some people not paying back due to illness during the agricultural season, and in one case a Farmer Research Team chairman kept the seed for himself. He subsequently was replaced. The total amount of farmers who received seed, and the total number of kilograms of legume seed collected, stored and distributed using this Community Seed Bank is as follows:

<table>
<thead>
<tr>
<th>Legume</th>
<th>2005 Kg Distributed</th>
<th>2005 # Farmers</th>
<th>2006 Kg</th>
<th>2006 # Farmers</th>
<th>2007 Kg</th>
<th>2007 # Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundnut</td>
<td>2883</td>
<td>1100</td>
<td>3880</td>
<td>1890</td>
<td>4750</td>
<td>2250</td>
</tr>
<tr>
<td>Soya</td>
<td>1810</td>
<td>824</td>
<td>2934</td>
<td>1300</td>
<td>3475</td>
<td>1940</td>
</tr>
<tr>
<td>Mucuna</td>
<td>1490</td>
<td>498</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pigeonpea</td>
<td>1000</td>
<td>1924</td>
<td>2000</td>
<td>2100</td>
<td>2880</td>
<td>1950</td>
</tr>
</tbody>
</table>

The village seed bank model appears to be very successful. The FRT have been able to recoup the loaned seed every year, and have increased our legume seed availability.
Ekwendeni Farmer Association
In the original proposal we indicated that a ‘Ekwendeni Seed Association’ would be formed by the seed multipliers. However, it was decided by the FRT, that instead, an “Ekwendeni Farmer Association” should be formed, which would be a separate farmer organization working to promote legumes, soil fertility, food security and nutrition using an agroecosystem approach. The farmers formed the “Ekwendeni Farmer Association” in 2007. They voted in a president, secretary and treasurer and all farmers who joined had to pay a membership fee of 50 Malawian Kwacha (approximately $Cdn 0.30). The leadership will be selected through anonymous voting on an annual basis. They received training from the Farmers Union, with support from the SFHC project, on farmer organizations, have written a constitution, including incorporating the importance of soil fertility, nutrition and food security promotion and family cooperation into the document. They have recently submitted their constitution to the Farmers Union to be recognized as a Farmer Organization by the government.

In 2006 the Marketing Coordinator found local markets for 153 participating farmers for soyabean, groundnuts and mucuna. In 2007, the Ekwendeni Farmer Association felt capable of finding markets on their own. They collected soybean seed from its members, and found a market locally. They negotiated a higher price than what farmers would receive on an individual basis. The Farmer Association intends to seek new markets in the coming year. However they are not solely focused on markets, but feel strongly that they need to emphasize the importance of nutrition and food security first. Many of the members of the Farmer Association are also part of the FRT.

Village Seed Fairs
It was planned that two annual seed fairs would be held, in which ‘seed specialists’ would be encouraged to display, teach about, and sell their local seed varieties. Research carried out by Rachel Bezner Kerr suggested that knowledge about different legume and maize seed varieties is limited, particularly amongst young people. Some elderly people have a substantial amount of knowledge about particular local varieties but many people do not know much about different seed varieties. It was hoped that the seed specialists would be motivated by the opportunity to enhance their status in the village, to share knowledge with fellow farmers, and as a source of income, and other farmers would be motivated by access to quality seeds and access to a respected source of seed knowledge. However, the seed fairs did not take place. In 2005, the loss of the Project Coordinator (Marko Chirwa) meant that some activities were disregarded. In 2006, it was organized in August, but the farmers indicated that this was too late, it would be better to be closer to harvest. There doesn’t seem to be enough interest from the FRT to carry out this activity.

Legume Varietal Trials
Experimental trials were conducted on soyabean (2004-05) cowpea (2005-06) and common beans (2006-08) to determine which varieties were most suited to the local ecological, social and cultural needs, and whether farmers were interested in these legumes. The common bean trials were conducted in collaboration with CIAT. Five trials were conducted annually, in two areas known to be appropriate for bean growth; three by a group and two by individual farmers, selected by the FRT. The inputs (ie seeds)

4 The linkage with Farmers Union was made through the recently funded sub-project done in collaboration with the University of Malawi, with support from the McKnight Foundation, and will be described under the ‘Project outputs and dissemination’ section.
were paid by CIAT. Participatory varietal selection was carried out on an annual basis at each trial site, involving approximately 160 participating farmers. The results of the trials were disseminated at FRT monthly meetings and to CIAT. Local field days were also held to disseminate the results to local farmers, organized by the FRT.

Common bean seed multiplication has begun as of 2007-08 season, with 300 farmers, selected by the FRT, as well as staff, based on interest and farming ability. Distribution through the Community Seed Bank is anticipated for the 2008 dry season.

The soybean trials were conducted for one agricultural season (2004-05) in collaboration with IITA. One variety in particular was selected through participatory varietal evaluation, and this variety was multiplied by 200 seed multipliers from 2005-2008. This varietal selection seems to have improved the quality of the seed. In addition, informal field observations by farmers in 2005 suggested that planting soybean in fields where legumes had previously been grown might increase rhizobia populations, thereby improving nitrogen fixation and plant growth. Farmers were encouraged by the FRT to plant soybean in fields where groundnuts or other legumes had previously been grown. This may be a second reason for improved soybean production.

Cowpea trials involved testing the intercropping of cowpea with pigeonpea as an alternative, drought-resistant edible legume option that also provides green leaves for consumption. These trials were conducted in 2005-06 in a drier region of the catchment area, and were highly rated by farmers for the production of both leaves and peas for consumption. Cowpea was distributed in 2006-07 to 20 farmers, but was not paid back due to lack of follow-up. There were not enough funds to purchase additional cowpea seed for multiplication and distribution in 2007-08.

**Maintaining Farmer Enthusiasm and Promoting OMT Knowledge**

A ‘Farmer Apprenticeship program’ was carried out for 3 years to encourage farmer-to-farmer learning opportunities. 456 new project participants visited active FRT members for two to four days during the agricultural season and ‘apprenticed’ for legume options promoted by the project. The Apprenticeship program was enthusiastically endorsed by farmers, with long-term project participants gaining the prestige of visiting ‘apprentices’, and new participants learning from their fellow farmers. However, this program is costly to staff in terms of funds and time, as the project has grown. Farmers often cannot walk to old areas due to the expansion of the project area (see Figure 1), so they need to be transported to these areas, and stay for several days. This greatly increases the cost of the program, and made it not feasible for 2008.

Other activities for promoting knowledge include field days, farmer exchanges, crop residue incorporation days, recipe days and workshops. We have had annual field days, where many different people have attended: farmers, Ministry of Agriculture representatives, hospital staff, researchers and students. We have had annual farmer exchanges to learn about different agriculture and nutrition issues within Malawi: sorghum, compost manure, vegetable garden production, community seed bank management and legume marketing. The Farmer Research Team has organized annual “crop residue promotion days” in which the farmers visit a village plot and have a public...
event around crop residue incorporation, to improve of soil fertility. Recipes days are
held 3-4 times a year, in which different healthy recipes are cooked and shared in a
village area. These events have become popular social gatherings in the last few years,
and are also a way to encourage men to become more interested and involved in child
care and feeding. Men increasingly attend the recipe days.

Theme II: Agriculture and Nutrition Discussion Groups and Village Nursery Schools

In 2005 we tried to collaborate with the Ekwendeni Hospital AIDS program through
providing legume seed to the Village Nursery Schools for orphans and food insecure
children. The legumes were to be grown by the volunteers who manage these schools,
and the crops could be added to the porridge fed daily to the children, to improve their
nutrition. However, there were two problems encountered with this activity. Firstly, there
was confusion between the FRT and the AIDS volunteers who manage the village
nursery schools over who was responsible for management of the plots. This issue of
‘ownership’ meant that many of the legume plots were not well managed. Secondly,
many of the FRT and AIDS volunteers were already overstretched, and the additional
labour burden of managing communal legume plots for the nursery schools was found to
be unsustainable in the long run.

Agriculture and Nutrition Discussion Groups

As described above (p.6-7), a participatory, problem-solving educational approach was
taken to address child nutrition issues, through the formation of Agriculture & Nutrition
Discussion Groups. The ANDGs involved monthly discussions about nutrition and
agricultural issues, facilitated by project staff and community members. ANDGs were
formed in six village areas (3 per year), which were selected by the project staff and FRT
members based on the following criteria:
- length of time involved in the project (i.e. joined in 2000-02)
- area where NRT was working, to build on nutrition education already
carried out in the area
- village leadership and community cohesion/enthusiasm in cooperative
activities (as shown by involvement in project activities)

At least half of the membership of the ANDGs was to be made up of the poorest, most
food insecure members in a village, based on wealth and food security ranking. For the
targeting of food insecure participants, the biggest challenge in this process was that
there were more people than could join in any given village. Meetings were held in each
area to explain the purpose of the ANDGs and members volunteered to participate.
However, the following groups were selected from those who volunteered:
- women with children under two years of age
- men with children under two years of age
- older men who have grandchildren
- older women who have grandchildren

These categories were used due to the overall goal of the ANDGs, to foster discussion
between different ages and genders and to encourage problem-solving across gender
and generational divides.
Project Outputs and Dissemination

Information Sharing and Dissemination

- **Field Days:** annual field days were organized by the FRT and staff, and representatives from the Ministry of Agriculture, Ekwendeni Hospital, local schools and other farmers were invited to attend. These events expanded so much that there were multiple field days held as of 2006, with 100+ people attending each field day.

- **Participatory Workshops:** project staff and FRT members held annual workshops with participating farmers to share research results and plan future project activities. These workshops included dramas, songs and discussions.

- **Website:** A website is under construction and anticipated to be ready by May 2008. The website will include published papers on our research results, and a summary of our research approach. It was designed by Rachel Bezner Kerr, Lizzie Shumba and Laura Swift, a CIHI intern, in consultation with other SFHC staff and farmers.

- **Canadian Foodgrains Bank case study:** A staff person from CFGB, Kenton Lobe, who is working on social and environmental policy implications of agricultural programs supported by CFGB, visited SFHC in 2007, and was impressed by the potential policy implications of our work. He presented SFHC as a case study at an international conference in Norway, hosted by the Norwegian government and organized by NGOs and farmer organizations, entitled "Can Africa Feed Itself: Poverty, Agriculture and Environment" (http://www.canafricafeeditself.no/Landbrukskonferanse/English/Programme/). Mr. Lobe also created a short policy document highlighting SFHC as one example of positive sustainable approaches to agriculture in Africa. This document has been sent to IDRC previously.

- **Case study in World Bank report on agriculture and nutrition.** The SFHC project was featured as an example of integrating agriculture and nutrition in a recent report by the World Bank (see http://www.donorplatform.org/content/view/129/117/).

Peer-reviewed scientific articles and book chapters: (* indicates in appendices)

Draft papers to be submitted for publication:

Satzinger, F., R. Bezner Kerr and L. Shumba. "Farmers integrate nutrition and agriculture through knowledge exchange in northern Malawi" (to be submitted to Public Health Nutrition anticipated submission May 2008).*


Published:


Reports: (* see appendices)

Presentations and Posters at Peer-Reviewed Scientific Conferences:


Workshops and Invited Presentations:


Knowledge Creation (other than reports, publications etc):

- **Scaling out to Kasungu region**: Linkage with the University of Malawi and Michigan State University: this is a research project that involves agronomic research on the legume options by a doctoral student. In addition, the University, in collaboration with an NGO and farmers in Kasungu District, are trying to replicate our approach and results. SFHC staff and FRT are providing training and support for this effort.

- **Scaling up with the Ministry of Agriculture**: In 2008 we met with the Ministry of Agriculture, Land Conservation department, who has become interested in our work in relation to soil conservation. They particularly appreciated our participatory approach and the FRT involvement. They have agreed to bring farmers from other regions in northern Malawi to learn from us, and then funding the initial legume seeds for farmers to try these legume options. This is a new collaboration with great potential for scaling up.

- **Farmer Pamphlets**: Based on discussions within the FRT and SFHC, and in the interest of spreading their knowledge to other farming communities, a pamphlet
committee’ was formed in 2008, made up of 6 members from the FRT. This committee is working with a new Canadian Society for International Health (CSIH) young professional intern, Laura Swift, to create pamphlets that summarize some of their key findings and knowledge gained from the project. A sample pamphlet is included as Appendix 8.

- **Canadian awareness tours:** The Canadian Food Grains Bank has sent two groups of Canadians (~20 people) to learn what we are doing, as well as someone from their policy group. They highlighted our efforts in a policy document to promote sustainable smallholder farming alternatives to Another Green Revolution for Africa. The Presbyterian World Service and Development has sent two additional groups of Canadians to learn what we are doing as part of our ongoing partnership with them.

- **Public Events and Networking in Canada:** The Canadian Food Security Group and the Canadian Coalition for Climate Action organized a public event in Ottawa in December 2007. Rachel Bezner Kerr gave a presentation to over 150 people at this event, highlighting how our work with the SFHC project addresses different dimensions of climate change, and spoke at a ‘policy workshop’ with ~30 representatives from the Canadian International Development Agency, DFAIT, World Vision, IDRC, CARE Canada, Farm Radio, academics and others. Follow-up requests for further information have been received from CIDA, DFAIT, Farm Radio and World Vision.

- **Radio programs in Malawi:** Farm Radio is interested in potential collaboration to make a regional radio program about our work, as part of a broader participatory action research project trying to improve food security for smallholder farmers through disseminating information and strengthening public participation in radio programs.

- **CIAT collaboration on bean trials:** On going trials were conducted on beans in order to determine the most suitable varieties to the local ecological, social and cultural needs. These trials were conducted in collaboration with CIAT and they were done in groups in 3 areas and each site had twenty varieties of bean. An annual participatory varietal selection was done and it will also be done this growing season since the farmers have grown the trials for the second year. The results which came out of the participatory variety selection was shared with other collaborating partners. This collaboration will continue for 2 years and will provide adapted varieties for farmers.

**Training (see capacity building below).**

**Capacity-building**

Capacity building has been a major focus of this phase, in fact, it was the third ‘Theme’ of the proposal. The following table summarizes the major types of capacity-building that has taken place. There has been considerable training and capacity-building of staff and farmers in research design, methods and analysis. There has been training of farmers and staff in facilitiation, group dynamics and leadership, gender and social equity issues and ecosystem approaches to human health. Staff have also had opportunity to present
at scientific conferences and meetings for the first time. We have also provided training and research opportunities to doctoral and college students, and to Canadian interns.

We had hoped to include two additional students in our research program to date, one doctoral (Bernard Kamanga) and one Masters (from the Nutrition department of the University of Malawi). Unfortunately, in the first case, Bernard failed to come to complete his research and collaborate with us. In the second case, the University requested a very high budget for one student ($10,000) and then indicated that the Masters students were too busy to work with us.

We are pleased to have both a Canadian and Malawian doctoral student involved in the SFHC project, one from the agricultural sciences and one from the social sciences. We are hopeful that our continued collaboration with the University of Malawi and the University of Western Ontario will give us opportunity to involve other graduate and undergraduate students in our project in the future.

<table>
<thead>
<tr>
<th>Type of Capacity-building</th>
<th>People involved</th>
<th>Trainer/Supervisor</th>
<th>Dates</th>
<th>Assessment and Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training on data entry (MS Access)</td>
<td>Patience Phiri (data entry clerk)</td>
<td>Ismael Teta (HealthBridge)</td>
<td>2005 (2 weeks)</td>
<td>Data entry improved</td>
</tr>
<tr>
<td>Training on SPSS preliminary data analysis</td>
<td>Patience Phiri (data entry clerk)</td>
<td>Chancellor College, University of Malawi</td>
<td>2006 (2 weeks)</td>
<td>Data analysis improved</td>
</tr>
<tr>
<td>Qualitative data collection training (interview techniques)</td>
<td>Lizzie Shumba, Patience Phiri, Laifolo Dakishoni, Rodgers Msachi, Nyles Mhone, some FRT members</td>
<td>Rachel Bezner Kerr (University of Western Ontario)</td>
<td>2005 (2 weeks)</td>
<td>Staff and some FRT able to carry out qualitative interviews</td>
</tr>
<tr>
<td>Gender and social analysis</td>
<td>Lizzie Shumba, Patience Phiri, Laifolo Dakishoni, Rodgers Msachi, Nyles Mhone, some FRT members</td>
<td>Rachel Bezner Kerr (University of Western Ontario)</td>
<td>2006 (1 week)</td>
<td>Staff and some FRT able to assess some gender and social inequalities in communities</td>
</tr>
<tr>
<td>Qualitative data design and collection (focus groups, designing a project)</td>
<td>Lizzie Shumba, Patience Phiri, Laifolo Dakishoni, Rodgers Msachi, Nyles Mhone, B. Zimba, some FRT members</td>
<td>Rachel Bezner Kerr (University of Western Ontario)</td>
<td>2006 (2 weeks)</td>
<td>Staff and FRT able to design and conduct a qualitative study (focus groups or interviews)</td>
</tr>
<tr>
<td>Computer skills (Power Point, Excel, Word)</td>
<td>Lizzie Shumba, Laifolo Dakishoni, Patience Phiri</td>
<td>Laura Sikstrom and Franziska Satzinger (HealthBridge interns)</td>
<td>2005 and 2006 (~8 hours total)</td>
<td>Some improvement in skills but more capacity-building needed for software e.g. SPSS and computer mg</td>
</tr>
<tr>
<td>Type of Capacity-building</td>
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</tr>
<tr>
<td>Participatory facilitation skills</td>
<td>Patience Phiri, Laifolo Dakishoni, Rodgers Msachi, Nyles Mhone, B. Zimba and ANDG facilitators</td>
<td>Lizzie Shumba, Rachel Bezner Kerr</td>
<td>2007 (1 week)</td>
<td>There has been an improvement in facilitation skills noted in the ANDGs and in farmer meetings.</td>
</tr>
<tr>
<td>Qualitative data analysis</td>
<td>Lizzie Shumba</td>
<td>Rachel Bezner Kerr</td>
<td>2007 (2 days)</td>
<td>Lizzie can carry out preliminary analysis (see Appendix 10) but needs further training.</td>
</tr>
<tr>
<td>Survey data collection</td>
<td>SFHC staff and hospital staff</td>
<td>Lizzie Shumba</td>
<td>2005 and 2006 (5 days)</td>
<td>Staff are able to conduct surveys.</td>
</tr>
<tr>
<td>Accounting upgrade</td>
<td>Laifolo Dakishoni</td>
<td>Malawi College of Accountancy</td>
<td>2007 (6 months)</td>
<td>Has acquired some advanced accounting skills but needs further coursework to acquire the degree.</td>
</tr>
<tr>
<td>Conference presentations</td>
<td>Lizzie Shumba and Laifolo Dakishoni</td>
<td>Not a training course, gave presentations at international scientific conferences (IUCN in Durban, and IDRC workshop in Nairobi). Peter Berti provided input for the Durban conference. Rachel gave input for both presentations.</td>
<td>2005 (Durban) and 2007 (Nairobi)</td>
<td>They are now much more confident about presenting results from the project to international conferences.</td>
</tr>
<tr>
<td>Diploma upgrading in nutrition; BSc in Nutrition</td>
<td>Lizzie Shumba</td>
<td>Natural Resources College (diploma upgrade) and University of Malawi, Bunda College of Agriculture (B.Sc.)</td>
<td>In progress</td>
<td>Lizzie has begun this program, but due to staff shortages has not been able to begin this diploma/degree until recently.</td>
</tr>
<tr>
<td>Group dynamics and leadership skills</td>
<td>500+ Farmer Research Team new members</td>
<td>Lizzie Shumba</td>
<td>2005, 2006, 2007</td>
<td>FRT have shown improvement in managing community conflicts and fostering learning.</td>
</tr>
<tr>
<td>Ecosystem approaches to human health, project</td>
<td>1000+ new participating farmers per year</td>
<td>FRT and SFHC staff</td>
<td>2005, 2006, 2007</td>
<td>New participating farmers, after hearing the project objectives and</td>
</tr>
<tr>
<td>Type of Capacity-building</td>
<td>People involved</td>
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<td>Dates</td>
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<tr>
<td>Seed multiplication</td>
<td>200 Farmer Research Team and seed multipliers</td>
<td>Lizzie Shumba</td>
<td>2005</td>
<td>Successfully multiplied seed.</td>
</tr>
<tr>
<td>Farmer association formation</td>
<td>50 members of the FRT</td>
<td>Farmers Union</td>
<td>2007 (1 week)</td>
<td>Farmer association has been formed.</td>
</tr>
<tr>
<td>Nutrition for young children (a 'refresher' course)</td>
<td>40 FRT members</td>
<td>Lizzie Shumba, Z. Nhonya and B. Zimba</td>
<td>2007 (3 days)</td>
<td>Farmers felt this 'refresher' course was helpful in their project activities.</td>
</tr>
<tr>
<td>Doctoral student research</td>
<td>Wezi Mhango (soil science, Michigan State University) and Lauren Classen (medical anthropology, University of Toronto)</td>
<td>Ongoing through conducting research with project. Dr. Rachel Bezner Kerr has provided on-site field supervision and input.</td>
<td>Lauren Classen (2006 – 7 weeks) and 2008 (1 year) Wezi Mhango (2007 – 1 month; 2008 – 2 weeks)</td>
<td>Both doctoral students benefit from collaboration with the project (i.e. field site with active farmers, logistical support, research input), and it is hoped that their research will provide useful input for follow-up activities.</td>
</tr>
<tr>
<td>5 HealthBridge interns</td>
<td>Laura Sikstrom Liesel Carlson Hinde Tizgati Franziska Satzinger Laura Swift</td>
<td>Lizzie Shumba Rachel Bezner Kerr Peter Berti</td>
<td>2005-2008 (each intern here for 5-8 months)</td>
<td>Interns gained experience and contributed to different research activities.</td>
</tr>
<tr>
<td>3 college students in nutrition and rural development (Natural Resources College; Skyway Business College)</td>
<td>Limbani Gondwe George Phiri Chimwemwe Hara</td>
<td>Lizzie Shumba; Rachel Bezner Kerr; Boyd Zimba</td>
<td>2005-2007 (1 month each)</td>
<td>Students gained experience in a research and development organization.</td>
</tr>
</tbody>
</table>

Project management
The project is managed by the SFHC staff in Ekwendeni Hospital, with input from the Farmer Research Team and Rachel Bezner Kerr. The Project Coordinator is Lizzie Shumba, following the loss of the late Marko Chirwa in 2005.

We have faced several challenges in project administration during this phase. The loss of Marko Chirwa, the former project coordinator was a tremendous setback, and it took many months for us to reorganize and reestablish management activities. The staff have needed help in capacity-building, but due to being short-staffed, it was difficult to allow them to go for further training. We are now in the position of having adequate staff for some to leave for training, but this is a fairly recent development (Fall 2007). The staff still rely on outside assistance for survey analysis, (i.e. HealthBridge) but due to the cost of this analysis, we have not been able to complete some of the analysis. In the future we hope to plan research that does not rely on this type of technical assistance, and we also hope to do further capacity-building to ensure that basic survey analysis can be done 'in-house'.

There are also several challenges that are faced in working within the hospital. As an agriculture project, the hospital cannot fund the staff, (normal hospital staff are funded through the Ministry of health). This means that the staff have an uncertain working situation for the future. Some of the working conditions, particularly pay and benefits, are also poor.

Impact
The project has had an impact on resource-poor farming communities in northern Malawi in terms of dietary diversification, high legume production, soil fertility improvement, access of legume seed within the catchment area, an improvement in child care and feeding. In addition, there is evidence of improvements in equitable household control over resources, with women having more involvement in decisions, and men now playing a bigger role in child care and feeding. The farming communities have also developed more organizational skills and ability to solve problems and make decisions related to food security and child nutrition, through the Community Legume Seed Bank, the Farmer Research Team and the Ekwendeni Farmer Association.

SFHC also addresses gender and household dynamics. The women are also making a very strong contribution to the project. Initially, 49% of participating farmers were women; now, 60% are women. Decision-making on cropping patterns and where to cultivate is done by women, and they also take control of household resources especially on how much food should be kept and shared within the household. Women are saying that it is more beneficial to them because of the food security aspects.

Overall assessment
In our assessment, this project has had multiple positive effects and reached out far beyond the borders of the Ekwendeni region to influence government departments, farmers in other regions, students and Canadian policy makers. Although the project has demanded considerable time, effort and financial resources, the overall results are worth these inputs.
Recommendations

Note: We have been overall very happy with our partnership with IDRC. The following recommendations are suggestions for some approaches that IDRC already undertakes, but we thought we would like to underscore them.

- Provide long term adequate support for projects or programs that use participatory, ecosystem methods to improve people’s lives. Building relations and developing appropriate methods takes time with this approach.

- Build in capacity-building for community organizations that are not research-based. This has been a critical component for this project.

- Provide some support for institutional strengthening and networking. Our project institution has struggled with poor working conditions for staff for years and need assistance in this area.

- Place less emphasis on the academic credentials and more emphasis on their community and ‘ecohealth’ credentials. In the first phase, we struggled to involve ‘PhDs’ because of IDRC encouragement, but found that these contacts were not interested in the ecohealth approach and quickly stopped working with us once they realized that there would not be much money involved.

- Build in flexibility for unexpected changes in the budget. The participatory and complex nature of ecosystem approaches to human health sometimes lead to changes in planned activities which require budget changes.