

**MEASUREMENTS OF FOOD SECURITY AND PRACTICE CHANGES AMONG FARMERS
PARTICIPATING IN THE ADVENTIST DEVELOPMENT AND RELIEF AGENCY
MOZAMBIQUE (ADRA MOZAMBIQUE) RURAL REHABILITATION PROJECT,
VILANCULOS, MOZAMBIQUE, AFRICA.**

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BY

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ABSTRACT

The author surveyed 173 participants (107 women, 66 men) in the ADRA Rural Rehabilitation Project, using a focused group interview technique. The participants represent 13 villages from the 4 districts in the project area. The survey tested for pre-determined indicators of practice change, measured increases in food security and well-being, completed a current needs assessment and defined future goals.

Significant impacts were measured at the practice change level of Bennett's program events model. Participants are no longer burning fields, they incorporate grass and leaves into the soil, crops are evenly spaced in rows with fewer seeds per hole, and rows of legumes are intercropped with rows of grain. Maize yields have increased 32% and peanut yields have increased 37%.

Food security is improved, but several barriers still exist. Farmers are still losing 50-75% of stored grains to weevils and rodents, offsetting gains in production. Poor storage conditions contribute to the need for crop seed distribution. Farm tools are in short supply. Non-functional water pumps or non-existent wells limit the production of horticultural cash crops.

In the future, most participants plan to continue farming and expand production. After personal consumption needs are met, cash sales will be used to purchase improvements for the farm, replace household goods lost or stolen during the war, and enroll children in school.

INTRODUCTION

The Government of Mozambique and The United States Agency for International Development (USAID) are dedicated to improving the quality of life for rural families comprising more than 90% of Mozambique's 14 million citizens. They desire an enabling environment that fosters 1) resettlement of 2.5 million citizens displaced by years of civil war and 2) increased food security by shifting food dependence from emergency aid to local agricultural production.

In 1990 USAID granted \$1.2 million to the Adventist Development and Relief Agency in Mozambique (ADRA Mozambique) to establish an educational program entitled "Rural Rehabilitation Project" for smallholder farmers (farmers with two hectares or less). ADRA Mozambique was to train rural agricultural extension workers and supervisors, establish demonstration plots and upgrade farmers' competencies in food production through extension education programs.

In February 1994, ADRA International submitted to USAID Mozambique a report entitled "Final Evaluation of the ADRA Rural Rehabilitation Project." (Appendix A) That report summarized inputs, activities, participation, and to some extent, reactions to the program. Documentation of practice changes and impact was incomplete. An error was made in the reported number of demonstration plots established. The report indicated 16 (or 30%) of the 54 originally planned demonstration plots had been established. The correct number is 28 (52% of the original goal), approximately one plot for each extension agent (some agents left the project, others cover more than one village). Several of the demonstration plots were just established during the 93/94 cropping season.

In March 1994, ADRA International contracted Greg Van Doren of Washington State University Cooperative Extension to measure the impact of the Rural Rehabilitation Project and assess needs for the future. He identified impact indicators by interviewing officials of ADRA International, ADRA Mozambique and USAID Mozambique (1,2,). Mr. Van Doren, in cooperation with ADRA Mozambique, arranged to gather and analyze survey data from farmers participating in the project. This impact data was correlated with field crop production data collection already in progress by ADRA Mozambique.

This report is intended to supplement evaluation documents previously submitted to USAID Mozambique by ADRA International.

CONCEPTUAL FRAMEWORK

Program Events Model

Learning can be assessed at any one level or combination of several levels. Claude Bennett (3) designed a program events model defining seven progressive levels of achievement that can be measured for impact.

7. End Results
6. Practice Change
5. KASA Change
4. Reactions
3. Participation
2. Activities
1. Inputs

INPUTS --money, curriculum, seed, tools, instructors--are used to conduct organized ACTIVITIES--demonstration plot visits, informal agricultural instruction--to which are invited PARTICIPANTS, who REACT to their participation in the activities, and who may change their Knowledge, Attitudes, Skills, and/or Aspirations (KASA CHANGE) which may lead to PRACTICE CHANGE--different land clearing and seed bed preparation methods, seeding, crop care-- that eventually may contribute to desired END RESULTS-- in this case, food security through sustainable food production practices.

"Impact" is defined here as the satisfactory completion of one level in the model that contributes to the achievement of another higher level, eventually leading to an improved livelihood for the Mozambican smallholder farmer.

Focused Group Interviews

The participant survey in this report utilized an adaptation of a focused group interview technique developed by James Long, Staff Development Specialist, Washington State University (4). The focused group interview is an information gathering technique borrowed from market research. Focused questions, prepared in advance, are used to survey members of small groups for their perceptions and feelings.

- Specific advantages of focused group interviews are:
- * reveals the range of view points on a topic
 - * collects real world data
 - * measures number of participants with similar perspectives
 - * cost effective when used on site
 - * gathers information synergistically
 - * evaluative data for future planning

PARTICIPANT SURVEY DESIGN

Due to time constraints, Mr. Van Doren elected to limit analyses of impact to traditional field crop practices. Mature crops in the field allowed visual verification of practice changes. Also, crop production data was being collected by extension supervisors to compare yields between traditional cropping methods and methods taught by ADRA. The fruit tree program was not analyzed because the trees are not yet producing fruit. Vegetable production data was not available and visual verification of practice change was not possible since planting season had just begun.

The following paragraphs describe the development and organization of the participant survey (Appendix B):

A list of practice change indicators was developed by interviewing the assistant director of the agriculture project and by reviewing instructional materials used to train agents. From that list, five practices were selected to use as indicators of change among farmers participating in the project:

- * land clearing without burning
- * grass incorporation
- * planting crops in rows
- * 2-3 seeds per hole
- * intercropping grain with legume

The practices listed above are representative Best Management Practices (BMP's) intended to conserve soil and sustain increased production over the long term. A sixth practice, weeding, was included as a check question. Weeding crops is a common traditional practice and should be answered as such.

The first section of the survey tests for practice changes. Farmers were asked neutral questions to determine their current cultural practices. If the desired indicator was mentioned, the number of farmers using that practice was measured.

The second section of the survey examines historical farming practices. Participants were asked specific questions about their cultural practices ten years ago, during the war. These answers were cross-checked with those given in the first section of the survey. Additional questions on food source, food duration, hunger, health, and trade activities were also included to measure the past state of well-being and food security among farmers.

The third section of the survey re-visits the practice change indicators and determines the source of learning and perceived benefit (or loss) of each practice change by the farmers.

The present state of well-being and food security are evaluated in the fourth section of the survey. Questions from the historical section were repeated in present context to measure any change.

A current needs assessment is completed in the fifth section of the survey. Specific questions were asked about problems with seed/food storage, transportation, marketing surpluses, tools, water supply, and pests. Farmers were then given opportunity to discuss any other problems. After the problems were listed, farmers were asked to prioritize their perception of the three greatest problems.

The final section of the survey examines future goals of the farmers. Farmers were asked about their plans to continue farming, farm expansion, crops they would grow, and what they would purchase or trade for if they had surplus to sell.

Survey Participants

The author and assistant director visited 13 representative villages from each of 4 districts in the project area. The local extension agent facilitated each group meeting of farmer participants. Total number of participants interviewed: 173. Table 1 shows the distribution of participants.

Table 1. Distribution of participants: location, sex, age. (N=173)

DISTRICT	VILLAGE	WOMEN			MEN		
		<20	20-40	>40	<20	20-40	>40
Govuro	Jofane	1	2	8		1	1
Govuro	Machacame	1	12	2			2
Inhassoro	Vulanjane		3			2	2
Inhassoro	Cometela		2	5			5
Vilanculos	Quewena		2	1			8
Vilanculos	Faiquete		1	2		2	3
Vilanculos	Chirruala		2	5	1		9
Vilanculos	Sumburane		3	8		2	9
Mabote	Tessolo		5				3
Mabote	Manhique		3	2			5
Mabote	Massengue		6				
Mabote	Gubogubo	2	1	3		6	1
Mabote	Mabote		2	23		1	3
Total: 173		4	44	59	1	14	51

RESULTS AND DISCUSSION

For testing purposes, the survey begins in the present and works backwards in time, then forward again. For ease of discussion, the results are organized in chronological order. Following the historical data, indicators of practice change are discussed, followed by measures of well-being. After the impact analysis, current needs assessment and future goals complete the discussion. Each village group of participants usually answered questions in unison. Except for future goals, differences between men, women, and age groups were insignificant so data were grouped together.

Historical Data

The situation during war years, as described by the farmers, was terrible. Bandits frequently raided the villages, stealing anything of value. Most farmers lost their tools, seed, crops, food, and household articles. Table 2 shows the distribution of today's farmers ten years ago.

Table 2. Distribution of Surveyed Participants 10 years ago. (N=173)

Number Living in Villages*	137	(79%)
Number of Participants Farming**	112	(65%)
Number Living in Refugee Camps	36	(21%)

*Participants often fled villages for weeks or months when attacked by bandits.

**Farms were usually very small and poorly maintained, because farmers often had to leave them unattended when fleeing from bandits.

Those that remembered farming in the past said they always cleared land by burning, incorporating only the remaining ashes. As expected, farmers said they had always weeded their crops. Unexpectedly, all but some farmers in the Mabote district indicated intercropping (albeit randomly planted) had been traditionally practiced for ages.

In Vilanculos, Govuro, and Inhassoro districts, planting was done haphazardly, with 4-8 seeds/hole (5 avg). In Mabote district, the farmers had already learned to plant 2-3 seeds per hole and recognized several advantages to using the practice.

During colonial days, some villagers remember being taught in church or school about planting crops in rows. None of them had applied the technique, except for some of the older farmers in Mabote district that remember planting cotton in rows.

Seed availability was limited during the war. Only in Govuro district was much seed stored. Small lots were hidden in numerous bottles buried in the ground. Each time a villager was beaten by bandits, he only revealed one stored location. Some farmers near the sea in Vilanculos district caught and sold enough fish to buy seed, others relied upon aid for seed or did not farm.

The participants that mentioned aid as a food source qualified their answers by saying that the aid usually only lasted for one meal, or a few meals if only a tiny portion was prepared at a time. Those that lived near the sea caught and sold fish to buy other food. Many of those without money, especially in remote areas, survived on wild plants (leaves, roots, & fruits).

21% of the surveyed participants (in villages near Vilanculos) lived in refugee camps in Vilanculos during the war. Most of these people did not even have land for gardens. One of the groups staying in a refugee camp described themselves as "...standing around like chickens waiting for a morsel of food." That group said most of their members died in the refugee camp.

Indicators of practice change

Table 3. Number of participants clearing land without burning

10 years ago (N=112)	Today (N=173)
0 (0%)	159* (92%)

*14 participants had already burned their fields before joining the project (1st year in project).

In villages with heavy timber growth, 28 participants indicated that they practiced controlled burning only of big stumps and large branches that could not be removed from the field. This was done after grass and leaves were incorporated and smaller branches removed. Most of the removed branches were used at home for firewood. Some farmers near Vilanculos sold firewood in the market.

100% of the participants indicated that they had learned to clear land without burning from ADRA Mozambique extension agents. Prior to participation in the project, all farmers had burned their fields.

Perceptions of benefit were mostly limited to observations that crops seemed to produce better. Only a few participants mentioned increased availability of nutrients. 16 of 17 participants from one village, in their first year of the project, were not sure of any benefit from burning. In another village, 7 participants said that they might burn again to get rid of thorns hurting their feet.

Table 4. Number of participants incorporating grass into soil:

10 years ago (N=112)	Today (N=173)
0 (0%)	159* (92%)

*14 participants had already burned their fields before joining the project (1st year in project).

Participants in most villages described the process of grass rotting into manure and observed an increase in production. Only a few people mentioned increased nutrient availability. Some people observed that seeds germinate more rapidly. Others mentioned an increase in soil moisture.

In one village, 11 participants observed that if some grass was saved and placed on the surface between crop rows, not as many weeds grew (mulching). The 17 participants from the village in it's first year of the project said that insufficient rainfall made any benefit hard to determine.

Table 5. Number of participants planting crops in rows:

10 years ago (N=112)	Today (N=173)
18 (16%)	157 (91%)

Eighteen participants over 40 years old said they had learned about planting in rows either in school or in church. 16 of the 18 participants that said they planted in rows before extension agents came only used that practice for growing cotton. The other two had already been planting crops in rows for several years. All others said they learned this practice from ADRA Mozambique extension agents. Most participants remarked that their work (planting, weeding, harvesting) was easier to organize because they could complete working in a row one day and return to the next row the following day. Many also commented on increased efficiency utilizing space in their fields and said yields were higher. Most attributed better yield to a combination of even spacing and increased air movement through the field.

Sixteen of the 17 participants from the village in it's first year of the project did not plant in rows. They all noticed that production was higher in the demonstration plot and the participating village secretary's field, and said they would plant in rows next year.

Table 6. Number of participants planting 2-3 seeds per hole:

10 years ago (N=112)	Today (N=173)
72* (64%)	157 (91%)

*66 of these farmers were in Mabote district.

Most participants observed less crowding and better individual crop performance. As one participant explained, "...with 4 or 5 plants in each hole, each plant produces only one ear (maize) but when thinned to one plant, it produces 3 or 4 ears that are much larger." Others said that when too many seeds are planted in one hole, some die and the seed is wasted. Many remarked that the same amount of seed could cover a larger area with the reduced number of seeds per hole. All farmers said that planting just one seed per hole was too risky. If that plant died, then the space was wasted.

Only the 16 participants from the village in it's first year of the program did not reduce the number of seeds per hole. All but one of them said they would change their practice next year. That person said he planted lots of seeds per hole so the plants would not all ripen at the same time and because mice ate half of the seeds.

Table 7. Number of participants intercropping grains and legumes:

10 years ago (N=112)	Today (N=173)
(71) (63%)	173 (100%)

Except for some villages in the Mabote district, farmers said they had always planted grains and legumes together. Some did it because of tradition, others because of limited space, but a few noticed particularly that maize and peanuts both performed better when grown together.

Participants from several villages in the Mabote district commented that whenever they intercropped anything with millet, only the millet survived. Since millet is the primary grain grown in that area, that may explain the lack of intercropping. Only the Mabote district participants credited ADRA Mozambique extension agents with teaching them how to intercrop. All participants said that ADRA taught them why intercropping was important and said that the results were even better now that they were planting in alternate rows.

Participants in two villages in the Vilanculos district were trained by the second project director that monoculture was better than intercropping. One village now believes this to be true. In the other village, participants ignored the recommendation and continued intercropping as they had for ages.

Table 8. Number of participants weeding crops:

10 years ago (N=112)	Today (N=173)
112 (100%)	173 (100%)

As expected, all farmers knew of the need to weed crops. Most said competition was the main reason for weeding. Some said the weeds would kill everything. Farmers were usually weeding 4 times during the season.

Assessment of Food Security and State of Well Being

Participants were asked specific questions relating to their food sources, duration of food supply, hunger, wellness, and surpluses for trade. Answers ranging from "none" to "all" were converted to numerical scores ranging from 0 to 4. The following tables show composite means (all ages, sexes and villages) for each question related to food security and state of well-being:

Table 9. Seed source	(Composite mean: 0=none, 4=all)	
	10 years ago	Today
Purchased	0.9	1.5
Stored	1.9	2.0
Aid	0.6	0.5

Farmers are only able to store about half of their needed seed supply. In the table, increased purchases without an increase in aid probably reflect the recent shift in aid policy from giving seed away to charging a symbolic price for the seed.

Table 10. Food source	(Composite mean: 0=none, 4=all)	
	10 years ago	Today
Purchased	0.9	0.2
Stored	0.9	3.8
Aid	2.1	0.0
Wild Plants*	1.2	0.0

*This category was added during interviews

Major shifts in food source have occurred. A score of 3.8 means that farmers are now living primarily on their own production. They are buying less food, receiving less aid, and not depending on wild plants for food.

Variations among villages in the past was great, as some received more aid, some had better crop production or access to fish, while others said they subsisted primarily on wild plants.

(Composite Mean: 0=none, 1=<week, 2=<month, 3=1-3months, 4=>3months)

Table 11. Food duration	(Composite Mean: 0=none, 1=<week, 2=<month, 3=1-3months, 4=>3months)	
	10 years ago	Today
	1.5	2.9

The reported duration of food supplies have increased from

about 2 weeks supply to about 2 months supply. If Mabote district is excluded, food supplies were reported to last an average of about 4-6 months, with some farmers keeping food for 8 months or more. Mabote district farmers still suffer from drought conditions and said they expect to have less than 1 month of supplies. Limiting factors to the duration of food supplies are discussed in the Needs Assessment.

	(Composite mean: 0=none, 4=all)	
Table 12. Food surplus	10 years ago	Today
	0.0	0.1

Very few farmers said they have any surplus food to sell or trade since food supplies for personal consumption are not yet sufficient. Only farmers in Machacame had some tomatoes, onions, sweet potatoes and garlic to sell in Save, 15 km away.

	(Composite mean: 0=none, 4=all)	
Table 13. Hunger	10 years ago	Today
	3.8	2.8

Farmers are still hungry much of the time, since their food supply does not last all year.

	(Composite mean: 0=none, 4=all)	
Table 14. Malnourished	10 years ago	Today
	4.0	2.2

Most farmers think that they are healthier now. Limited rations of food and little variation in diet still contribute to malnourishment. Access to medical facilities was lacking for most farmers.

Impact Analysis

This survey documents that the ADRA Rural Rehabilitation Project has produced measurable impacts up to the sixth level of Bennett's model: PRACTICE CHANGE. Farmers are producing most of their food supply in 3 of the 4 districts. Land use practices have improved since burning has stopped. Incorporation of leaves and grass is supplying some nutrients and organic matter to improve crop performance and soil tilth. Non-participants in the extension project are observing the successes of participants and beginning to adopt similar practices.

Several other factors are contributing to increased crop production. By reducing the number of seeds per hole, less crowding

and plant competition occurs. Intercropping rows of grains and legumes allows some of the nitrogen fixed in the soil by the legume to be used by the grain. Crops planted in rows have helped farmers organize their work habits and facilitate weeding.

The assistant director and supervisors had collected crop production data for maize and peanuts and some millet at the time of this report. They compared the crop yields of participants and non-participants in each village. The data in Table 16 shows a yield comparison for crops harvested at the time of this report. No data for cowpeas or sorghum is available due to pest attacks decimating the crops. Data collection continues as crops are still being harvested.

Table 16. Yield comparisons between participants and non-participants in the ADRA Rural Rehabilitation Project.

Crop	Avg. Yield (kg/ha)	% Increase
Maize	621 (17 non-participants, 7 villages)	32%
	821 (52 participants, 7 villages)	
Peanuts	383 (13 non-participants, 5 villages)	37%
	526 (34 participants, 5 villages)	
Millet	306 (2 non-participants, 1 village)	20%
	367 (4 participants, 1 village)	

Sustained practice changes will contribute to the achievement of food security (END RESULTS). Some progress has been made in improving food security but several important barriers still exist. Existing barriers are discussed in the *Needs Assessment*.

Demonstrations were crucial to the success of the extension program. Most farmers said they were convinced to change their practices by observing what occurred in the demonstration plot. Some participants implemented practice changes concurrently with the extension agent's demonstration plot. Considering the education level of most extension agents (4th grade) and their ages (some under 20), these demonstration plots are a remarkable achievement.

Needs Assessment

Farmers were asked specific questions to determine the range and magnitude of problems they have. After answering the questions, they were asked to discuss any other problems. Finally, as a group of men and women together, they had to prioritize their problems. Each group was asked to eliminate all but the three most important problems, and then rank them.

Discussions lasted for 10 to 20 minutes before any consensus was reached. Some asked why they had to limit their list to three problems. They were told that donor agencies needed to know which problems should be solved first and that funding may not be available to solve all the problems. On this basis, the priorities were determined by the farmers.

The data from these questions were analyzed and comparisons between villages made. Table 15 shows the composite ranking of priorities among the 13 villages surveyed (The individual village rankings will be kept on file for future project development).

Table 15. Composite ranking of priority problems among 13 villages.

Topic	Rank:	1st	2nd	3rd
Insufficient Crop Seed		4	2	3
Insufficient Water		4	2	1
Tools		3	7	3
Storage Pests		2	1	5
Traction Animals or Tractors			1	1
	Total	13	13	13

The need for crop seed was well distributed throughout the region. Participants either said their seed was destroyed by pests or performed poorly when planted. 8 of the villages listed storage pests as one of the top three priorities but many ranked the control of storage pests at a lower priority than seed problems. Many farmers said some of the seed they received last year from ADRA did not germinate. Evidently, they received some poor seed lots, primarily peanuts. Several villages requested vegetable seed.

Stored grain pests are the greatest threat to food security in the region. Every village said they were losing more than half of their stored grain to weevils and rodents. One village said they lost more than 75% to weevils. Grain stored more than 2 months became heavily infested. In the Mabote district, where supplies rarely last longer than that, storage problems did not occur every year. Some villagers built their cooking fires below the storage area to slow the process, but this was still ineffective after several months of storage. At the loss levels described, even a threefold

increase in food production would still result in an insufficient food supply. Until food and seed storage problems are solved, farmers will be dependent upon other sources of seed and food aid.

Insufficient water and watering cans are the main barriers to a successful horticulture program. 3 of the 4 villages that ranked insufficient water supplies first were in Mabote district. Massengue and Gubogubo both have deep wells with nonfunctional pumps and villagers have to haul water 2-3 km. In Mabote, farmers want a well near their farms (5-6 km from village) so they can grow horticultural crops. In Vulanjane, Inhasorro District, villagers haul water from 3km away because they cannot dig through rock to get water. They want the water for domestic use and for horticultural crops. In Chirruala, Vilanculos District, the land around the village is owned by other people. The farmer's fields and original village are about 12 km distant. The water supply there has dried up. The villagers would relocate to their original home if a well existed.

Every one of the 13 villages surveyed ranked the need for tools as one of the top three priorities. In all villages, farmers had to borrow from each other or family members had to take turns working, as there were not enough tools for husbands and wives to work at the same time. At best, work efficiency is less than 50%. Land clearing and soil preparation may take as long as two months to complete. All farmers asked for basic tools: primarily hoes, then in decreasing priority, machetes, axes, water cans, rakes, handsaws, and sickles. A new item requested by many farmers was rubber boots, not only for working in waterlogged areas, but also for feet and lower leg protection in all fields. One group said they often had cuts from sharp branches and thorns.

Draft animals were important to many farmers, but except for one village, they placed them 4th or 5th (behind small animals) in priority. In another village, the secretary thought they needed a tractor. Most farmers recognized that tractors were too expensive and hard to maintain so they favored animal traction. Plows and harnesses are included with the need for draft animals.

In many villages, chickens and goats were the 4th priority. Farmers planned to use small animals to breed for cash sales and to supplement their diet with eggs and meat. Several villages had problems with diseases affecting their animals. The assistant director identified chicken diseases as Newcastle disease and fowl typhoid. Some goats died because the rear legs were paralyzed, probably swayback disease.

Other problems varied among villages. In Gubogubo, ants were such a problem in homes, that villagers often slept outside. Cometela had hand dug wells, and wanted concrete rings installed in them. Manhique had problems with thieves stealing stored food and lacked cooking pots. Several villages complained that tools and seed were distributed too late for proper use, and requested that ADRA try to match the distribution with land clearing (August-October), and planting seasons (October-November for

field crops, February-March for horticultural crops).

Most villages ranked material inputs (seed, tools, animals) higher than labor inputs (time, manpower). Most people haul water 1-3 km. All produce from the fields is carried on their heads, usually 3-5 km, but sometimes as far as 12 km (3 hours each way), yet transportation problems ranked lower in priority.

Future Goals

Participants were asked if they planned to continue farming 10 years from now or look for another occupation. Except for 3 young women in Massengue that wanted a chance to do something else, all farmers planned to continue farming. Many said it was all they knew how to do, but a large number also said it was their preferred way of life. One farmer stated, "you can lose your job in the city, but farming lasts forever."

All planned to expand their production to satisfy their family needs first, and then generate surplus for sale or trade. When asked what they would plant, the majority said that traditional crops came first, and horticultural crops followed - if there was water available. Many said they would try new crops if the demonstration plots showed that the crops were adaptable and if seed were available.

Participants were asked what they would buy if they had surplus crops to sell or trade. A summary follows:

Some men tended to dream beyond practical means, thinking of tractors. Men usually mentioned large animals first, such as cows for draft animals followed by goats and chickens. Several said they would travel to visit relatives. One man said he would buy a grinding mill for the village. Some said they would buy sharpening stones.

Women either mentioned small animals or clothing first. Many then listed household items such as plates, cups, pots, salt, sugar, oil, soap, etc. Blankets were mentioned often. Some women said they would open a store to sell their surpluses.

Both men and women wanted better education for their children. They said they needed money for books, pencils and tuition before the children could go to school. In several villages, both said they wanted to build better homes. Even though most farmers carry their supplies on their head for long distances, only a few said they would find better ways to transport their goods. Many farmers said they would use cash to obtain better medical care and buy medicines.

RECOMMENDATIONS

Improved seed and food storage methods must be achieved before improved crop production practices can result in increased food security. Any future projects should have this as a high priority. Storage devices need to be designed that are secure from weevils and rodents and designed with a single family unit in mind. The author suggests that chemical control of stored grain pests needs to be seriously considered. Since seed storage remains a current problem, subsidized seed sales should continue.

Non-functioning wells should be repaired and reliable pumps installed. Available water and watering cans are pre-requisite for successful horticulture projects. Horticultural crops education projects should be continued, to generate cash crops and provide dietary supplements. Regions such as the Mabote district that have insufficient rainfall for stable field crop production need to emphasize horticultural crops where water can be supplied.

Tool distribution should remain a high priority. Tools could be sold at a symbolic price, similar to seed sales. New projects should include tool distribution prioritized according to the rankings in the needs assessment.

Many of the techniques taught by extension workers to the farmers will require reinforcement for a few years. The demonstration plots should be continued as teaching centers for transferring new skills to farmers. Those that participated in this project can be referred to as "early adopters". Continued demonstrations are needed to convince the larger population of "middle and late adopters" to change their farming practices.

One of the primary constraints in this project has been the shortage of reliable transportation for extension agents and supervisors to communicate with each other and with farmers. Because of the distances traveled by agents, bicycles are not practical. Motorcycles are less expensive than 4 wheel drive vehicles, require less fuel, and are not as expensive to repair when inexperienced drivers have accidents. Repair and maintenance costs for vehicles should be expected to be much greater than normal due to terrible road conditions and difficulties in obtaining parts. It is highly recommended that any project requiring vehicles submit sufficient budget requests to maintain equipment. The hiring of a professional mechanic, located onsite, is also highly recommended. The cost of a good mechanic will be more than offset by increased efficiency, less down-time, and a lower magnitude of repairs.

Both of the first two agriculture project directors were good scientists. If anything was lacking, it was their understanding of rural extension work. It is recommended that future directors have experience in rural extension work in addition to agronomic training.

Considerable effort was required to train supervisors and extension workers with minimal resources. Some of the training materials were too difficult for extension workers and contained misinformation. ADRA Mozambique could cooperate with experienced organizations such as Washington State University to develop effective teaching materials or conduct workshops according to project needs. Washington State University currently has a project to develop a curriculum for agricultural extension workers at Bunda College of

Agriculture, Lilongwe, Malawi. These materials could be adapted for use in Mozambique under a development grant.

REFERENCES

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APPENDIX A

(Final Evaluation of the ADRA Rehabilitation Project, February 1994)

APPENDIX B

ADRA REHABILITATION PROJECT
Participant Survey

District _____

Village _____

Agent _____

Demonstration Plot?

Date _____

Farmers Present:

	Age Group		
	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

I. CURRENT FARMING PRACTICE CHANGE INDICATORS

Specific questions to determine whether or not a practice change has occurred.

Question: How is land cleared for farming?

Indicator: no burning
Age Group

	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

comments:

Question: What is done with removed vegetation?

Indicator: grass incorporation.
Age Group

	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

comments:

Question: How are your crops planted?

Indicator: planting in rows.
Age Group

	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

comments:

Indicator: Number of seeds per hole.
Age Group

	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

comments:

Indicator: Intercropping grain and legume.
Age Group

	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

comments:

Question: How is crop cared for?

Indicator: weeding.
Age Group

	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

comments:

II. HISTORY

Questions to verify quality of life before relief projects in the absence of accurate baseline data to determine if practice changes brought about end results.

Question: 10 Years ago, or during the war, how many of you were living in this village?

	Age Group		
	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

Question: How many of you were farming during that time?

	Age Group		
	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

Question: How many of you cleared land by burning?

	Age Group		
	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

Question: How many of you were planting crops in rows?

	Age Group		
	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

Question: How many of you were intercropping legumes with grains?

	Age Group		
	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

Question: How many of you were weeding your crops?

	Age Group		
	<20	20-40	>40
Men	_____	_____	_____
Women	_____	_____	_____

Question: What was your seed source? (All age groups)

	None	Some	Half	Most	All
Purchased	_____	_____	_____	_____	_____
Stored	_____	_____	_____	_____	_____
Aid	_____	_____	_____	_____	_____

Question: Where was your food source? (All Age groups)

	None	Some	Half	Most	All
Farm	_____	_____	_____	_____	_____
Purchased	_____	_____	_____	_____	_____
Aid	_____	_____	_____	_____	_____

Question: Did you go hungry (without food)?

None	Some	Half	Most	All
_____	_____	_____	_____	_____

Question: How long did your food supply last?

One week or less	_____
One month or less	_____
1-3 months	_____
3 months or more	_____

Question: Do you think you were malnourished?

None	Some	Half	Most	All
_____	_____	_____	_____	_____

Why?

Question: Did you have surplus for sale or trade?

None	Some	Half	Most	All
_____	_____	_____	_____	_____

III. SOURCE OF LEARNING

General questions to ascertain if learning occurs from relatives, community leaders, Ministry of Agriculture, ADRA, or others AND determine perceived benefit of practice change.

Question: Who taught you (showed you) how to clear your land without burning?

How has that helped you? (Look for indicators such as soil improvement or other uses of wood)

Question: Who taught you how to incorporate grass?

How has that helped you? (Indicators: soil improvement, water holding capacity, yield)

Question: Who taught you to plant seeds in rows?

How has that helped you? (Indicators: ease of management, optimized production)

Question: Who taught you to plant 2-3 seeds in each hole?

How has that helped you? (Indicators: less crowding, less seed waste, larger area planted)

Question: Who taught you to intercrop grains with legumes?

How has that helped you? (Indicators: better plant growth, quality of produce)

Question: Who taught you to weed your crops?

How has that helped you? (Indicators: less moisture stress, better plant growth, increased production)

IV. QUALITY OF LIFE

Questions to determine whether practice changes have end results.

Question: What is your current seed source?

	None	Some	Half	Most	All
Purchased	_____	_____	_____	_____	_____
Stored	_____	_____	_____	_____	_____
Aid	_____	_____	_____	_____	_____

Question: What is your current food source?

	None	Some	Half	Most	All
Purchased	_____	_____	_____	_____	_____
Stored	_____	_____	_____	_____	_____
Aid	_____	_____	_____	_____	_____

Question: Are you hungry now?

None	Some	Half	Most	All
_____	_____	_____	_____	_____

Question: How long does your food supply last?

One week or less	_____
One month or less	_____
1-3 months	_____
3 months or more	_____

Question: Are you malnourished/do you think you are healthier now?

None	Some	Half	Most	All
_____	_____	_____	_____	_____

Why?

Question: Do you have surplus to sell or trade?

None	Some	Half	Most	All
_____	_____	_____	_____	_____

Which surplus crops do you have?

V. CURRENT NEEDS ASSESSMENT

Questions to determine major problem areas that could be improved.

Question: What problems do you have with seed and food storage?

Question: What problems do you have with transporting crops from fields to your home or to the market?

Question: What problems do you have marketing your surplus crops? (excluding transportation)

Question: What problems do you have with your tools?

Question: What problems do you have with your water supply?

What problems do you have with pests?

What else do you think is a problem?

PRIORITIZATION OF PROBLEMS

Question: What problems in agriculture do you think are the most important and need to be solved first? (After listing, ask participants to rank them)

VI. FUTURE GOALS

Question: Do you plan to continue farming?

Why?

Question: Do you plan to expand your production?

Why?

Question: Do you plan to grow something different or change your rotation?

Why?

Question: What improvements would you make, purchase or trade for if you had surplus crop or cash?