The Effect of Cash Cropping, Credit, and Household Composition on Household Food Security in Southern Malawi

ANDREA S. ANDERSON

Abstract: Diversifying household activiies is essential to household food security in Southern Malawi. Farms are extremely small; many farms are less than half a hectare. With these small landholdings, food security cannot be achieved by subsistence farming alone. Cash crops and off-farm income are key to these livelihood systems. This paper presents the findings of research conducted in 1998 as a part of a study to examine options for improving household food security in Southern Malawi. The researcher used linear programming to model household farming systems. These models were used to test different options for improving food security. The following options were tested: a maize safety net, a fertilizer safety net, introducing credit for tobacco, increasing off-farm work opportunities, and introducing a loan to start a small business. This study also considered differences between female-headed households (FHHs) and male-headed households (MHHs) to discover if there were differences between the two household types, and if so, to find out how the differences affect the households' situations.

Introduction

Malawi is a small country in Eastern Africa bordered by Tanzania, Mozambique, and Zambia. In 1999, Malawi's population was approximately 10 million, 87% of which lived in rural areas.[1] Agriculture is extremely important to the country, as it provides employment for nearly 90% of all households, accounts for 40% of the GDP, and generates 77% of the revenue from Malawi's exports.[2] Smallholder farmers are important, as almost 70% of the agricultural produce comes from smallholder farmers. In Malawi, as in other African nations, women do a good deal of the farming.[3]

The dry season in Malawi lasts from May until October, and the rainy season lasts from November to April.[4] Most agricultural work occurs during the rainy season, and crops are harvested at the end of this season in April, May, and June. In the dry season, the land is prepared by burning the crop residue and turning it under, and by making ridges for maize planting.

The typical farming system in this study area is a maize-based system, with other food crops, such as cassava, pigeon peas, beans, groundnuts, and pumpkins, intercropped with the maize. The majority of these food crops are eaten, while some households sell small amounts in the market. Some households grow cash crops for sale, such as tobacco or rice. Most households participate in some form of off-farm work. In male-headed households, the man is usually the family member to participate in off-farm work, while in female-headed households, the female head of the household participates in off-farm work alone, along with other household

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members, or another household member would participate in the off-farm work alone. This off-farm work is extremely important, as it is often the main source of income for the household. Malawi is the sixth poorest country in the world, and many Malawian households are food-insecure.[5] Nutritional deficiency is the number one cause of death for children under the age of five.[6] Malnutrition is a factor among adults as well, adding to the problems of disease, hard labor, and early and frequent pregnancies among women, which all contribute to the poor health of many rural adults.[7]

CONSTRAINTS TO FOOD SECURITY

Household food security has been defined as "sufficient food consumption by all people at all times for a healthy and productive life."[8] Achieving food security in Southern Malawi will require implementing strategies that improve the overall household livelihood system. It will require more than simply improving crop yields. Landholdings in this area of Malawi are very small, and most smallholder farmers are not able to grow enough food to sustain their household, even under ideal situations. Forty-one percent of the rural population is farming less than 0.5 hectares.[9] This is only enough land to produce three to four months of food, and the rest is purchased, often by *ganyu* work, informal farm labor that is paid either with cash, maize, or other food.[10]

Off-farm income is extremely important to the household livelihood systems of this area of Southern Malawi. However, many households in the area lack access to higher-paying types of off-farm work, such as employment in the formal sector (an official job, paid with a salary or wages). Informal sector work, any "unofficial" job, included activities such as working as a vendor in the market or participating in *ganyu* labor.

Many households participate in the lower-paying informal sector by running small businesses or doing g*anyu* labor. *Ganyu* labor, although available to most households, is generally very low paying and is usually only available in the agricultural months when farmers are busy with their own fields. Many households are unable to earn enough money to purchase sufficient maize in months after their own maize stocks are gone.

Household composition largely determines the way in which a household is able to respond to changes. Household composition is defined as the number of individuals in a household and their ages and genders.[11] It affects the amount of available farm labor, determines the food and nutritional requirements of the household, and often affects household food security. In this paper, only differences between MHHs and FHHs were considered.

Female-headed households (FHHs) have additional constraints to achieving food security. They tend to have smaller farms, lower agricultural yields, less access to inputs, and less available labor. Women's farms (cultivated by FHHs or married women) are much smaller than men's farms, and FHHs constitute 40% of the smallholders with less than 0.5 hectares of land.[12]

FHHs also generally earn less money than MHHs. FHHs often participate in the informal sector, selling small amounts of crops, making and selling goods, or in *ganyu* labor; however, the informal sector usually generates less revenue than the formal sector.[13] FHHs also have the added constraint of having one fewer laborer for the family, since there is usually no adult male

in the household. Without an adult male, the household often lacks access to better land, fertilizer, and higher-paying off-farm work.[14] Because of this, FHHs are often in the lowest income bracket.[15] In Malawi, they make up 42% of the poorest households, even though they are only 30% of all rural smallholder households.[16]

DATA COLLECTION

In June and July of 1998, in-depth surveys were administered to 20 smallholder farming households, 8 FHHs and 12 MHHs, in three villages in the area around the town of Malosa in the Zomba district of Southern Malawi. The results of this study were used to construct linear programming models (LPs) of livelihood systems in order to test options that could improve household food security in the study area. The construction and use of the LP models is discussed later.

All households interviewed were in one of three area villages. The villages were Nkalo, Mpama, and Jauma. These villages were chosen because of their proximity to each other and because of the similarities in their livelihood systems and farming conditions. Within these villages, households were randomly surveyed regarding household composition. Households with at least two household members were asked if they were willing to participate in the study. Among these households were FHHs and MHHs, families with only small children and families with older children who helped on the farm, and those with and without access to credit. None of the households interviewed from these villages grew tobacco, so in addition to these families, two households (from other villages) growing tobacco were interviewed.

The survey was administered to households in the form of a personal interview. This allowed for open-ended discussion if an answer was unclear. A predetermined set of questions gave direction to the interviews and ensured that the researcher obtained all the information that she set out to obtain. It also standardized the information received from each household to ensure that all households answered the same questions. However, the interviews were also informal, and allowed for discussion of other issues not mentioned on the survey.

The survey was divided into three parts. The first part of the survey primarily dealt with land and labor issues. Questions assessed the household's land use, crop yields, and farm inputs (such as fertilizer). Other questions dealt with on-farm labor requirements for each crop grown and off-farm labor. This part of the survey also asked labor-related questions about the household, such as, "who does household chores?"

Crop yields were determined by asking the farmers how much of each crop they were able to harvest in the previous year, and if these were typical yields. Fields were measured to determine their size. For fields that were too far for the researcher to visit, the farmer would provide an estimated size of his or her farm.

The second part of the survey gathered information about household cash flow. Questions dealt with farm cash inputs and outputs, household income, and household expenses. Other questions dealt with credit, including as access to credit and repayment of credit. Finally, questions concerning household decision-making were asked, such as "who is responsible for decisions regarding family/money/crops grown?"

The third part of the survey was based on a questionnaire developed by Robert Uttaro.[17] Selections used from this instrument included several questions about possible constraints to fertilizer use and possible constraints to using credit. Farmers were asked about their knowledge of the different techniques and their willingness to implement them. These questions allowed the interviewer to discover what, if any, constraints farmers faced in implementing each change.

Each section of the survey was administered in a separate session, which required each household to be visited and interviewed three times. Each session took between thirty minutes and one hour. Often the researcher was only able to interview the woman in the household, because the man was unavailable. However, if the man and woman were both available, the interview was conducted with both present.

RESULTS OF RESEARCH

Smallholders surveyed all had very small landholdings. As shown in Table 1, half the smallholders studied were farming 0.5 hectares or less. However, the FHHs tended to have less land than the MHHs. Of the FHHs, six out of eight households had 0.5 hectares or less, while only four of 12 MHHs had landholdings that small.

Table 1: Farm sizes of households studied

	0.5 ha	0.6 - 1.0 ha	1.1 - 1.5 ha	1.6 - 2.0 ha	2.1 ha	Total
FHH	6	1	1	-	-	8
MHH	4	7	-	-	1	12
Total	10	8	1	-	1	20

Many farmers interviewed were unable to use very much fertilizer to improve their yields. FHHs seemed to be in a worse situation than the MHHs, since half of the FHHs surveyed were not using any fertilizer, whereas only three of the 12 MHHs were using no fertilizer. As a result of the farmers' extremely small landholdings, low yields, and a lack of fertilizer use, only three households studied were found to be self-sufficient in maize production (two MHHs and one FHH). The seventeen other households surveyed were forced to purchase maize during the year to supplement the maize they grew.

Table 2: Fertilizer Use

KgN/ha	0	<10.0	10.1-20.0	20.1-30.0	30.1-40.0	40.1-50.0	50.1-60.0	>60.0	Total
FHH	4	-	1	-	2	-	-	1	8
MHH	3	-	3	5	-	1	-	-	12

Total	7	-	4	5	2	1	-	1	20

Hybrid maize responded better to fertilizer and had higher yields than local maize. However, as shown in Table 3, because of the cost of the seeds, storage difficulties, and other problems, many smallholders surveyed did not grow hybrid maize. Most of the FHHs (six out of eight) were growing only local maize; the other two FHHs grew both local and hybrid. More MHHs were able to grow the higher-yielding hybrid maize, two MHHs growing only hybrid and seven growing both varieties. Only three of the 12 MHHs grew only local maize.

Table 3: Local vs. hybrid use

	Local Only	Both	Hybrid Only	Total
FHH	6	2	-	8
MHH	3	7	2	12
Total	9	9	2	20

Since 17 out of the 20 households studied were not self-sufficient in maize production, a lack of cash available for food purchase would be a hindrance to food security. All households either participated in some type of off-farm income activity, received remittances from a family member who lived elsewhere, or both.

As shown in Table 4, four FHHs and four MHHs participated in *ganyu* labor. Although *ganyu* labor was an important source of cash and food for these farmers, some commented that there was a shortage of available *ganyu* work. This shortage lessened the amount of work they were able to do and affected the amount of cash or food they were able to earn. FHHs who did *ganyu* work averaged only 3 months per year in *ganyu*. MHHs worked an average of 5.25 months per year in *ganyu*.

Small businesses, such as selling clothing or baked goods in the market, were run by four FHHs and four MHHs. However, two of these FHHs' businesses were selling firewood in the village and the market. Although this activity has been included in the "small business" category, selling firewood requires no credit and earns much less income per month than other businesses. One constraint to starting a small business was a lack of access to credit. MHHs with informal sector income sources made an average of K1175 per month. FHHs only made an average of K701 per month. This K474 difference is due to a number of issues for FHHs, including less hours worked off-farm, and lower-paying types of informal work.

Only one FHH and five MHHs studied held formal sector jobs. Formal sector jobs tended to be higher paying than *ganyu* labor or small businesses. Households where a family member had a formal sector job tended to be much more financially stable and food-secure. Households with formal sector employment made an average of K1900 per month, although there were wide variations between households.

Table 4: Off-farm income

	Ganyu [a]	Informal Sector Job/ Small Business	Formal Sector Job	Remittances	Total
FHH	4	4	1	2	8
MHH	4	4	5	1	12
Total	8	8	6	3	20
[a]) Some households had more than one income source.					

As mentioned previously, one of the difficulties in beginning a small business was a lack of credit availability. As shown in Table 5, only two of the households studied used credit. Both households were FHHs. More FHHs than MHHs knew how to obtain credit as well. Six households knew where to get credit, and fourteen households did not know where to get credit. Of households without credit, eight households did not want credit. Six of these eight households reported not wanting credit because they were afraid of not being able to repay the loan.

Table 5: Credit

	Credit Use		Credit Sources	
	Use Credit	Do Not Use	Know of Sources	Do Not Know
FHH (total = 8)	2	6	4	4
MHH (total = 12)	-	12	2	10
Total (total = 20)	2	18	6	14

As the previous tables show, the FHHs studied had overall less land, used fertilizer less, used hybrid maize less, and had less cash income than the MHHs studied. They did, however, have more access to credit.

LINEAR PROGRAMMING

From the data collected, a linear program was developed using *Microsoft Excel*. A linear program (LP) is a program created on a computer and used as a planning tool for deciding between a large number of choices. LPs have been used in Farming Systems Research and Extension to model farming households' livelihood systems in order to reflect an accurate picture of the system.

An LP works by changing the quantities of different inputs to maximize a single output variable, which is selected by the researcher. The LP maximizes that variable by changing other inputs, such as hectares of land used for each crop, kilograms of crops sold, kilograms of food purchased, kilograms of nitrogen per hectare of fertilizer applied, and hours spent on off-farm work. If there are minimums that must be achieved for the household to be maintained, the LP will make sure to meet those minimums. For activities with household labor requirements, the LP will require the household to meet the labor requirement in order to pursue that activity. In this way, all of the household's resources are considered in the LP.

For this research, year-end cash remaining was maximized. Minimum household requirements included cash requirements and food requirements. As an example of a household labor requirement, if growing one hectare of maize requires 100 hours of labor in April, a household must have 100 hours of available labor in April in order to grow a hectare of maize.

Once an LP model accurately reflects a household's farming system, it can be a framework for testing alternative activities-such as growing a cash crop-before testing them on-farm.[18] The simulation can help the researcher to discover whether or not households would have the resources to implement certain activities.

Each LPs is programmed for an individual household's constraints-not using averages, but using data from an individual household, such as the amount of available agricultural labor from the family members, labor requirements for the farm, and the availability of off-farm income to the family. Furthermore, the amount of food and cash required by the individual household must be met in the LP solution for the program to find a solution ("to solve"). Therefore, an individual LP will not generally model an entire country or region.

The LPs in this research are modeled after real households. Since they are household specific and required a lot of time to collect the data and create, it would have been difficult to create enough LPs to have a statistically significant sample. Despite its small size, this data set provides information regarding what options would be candidates for real-life testing in the Malosa area. This data may also be beneficial in other areas of Southern Malawi with similar farming systems, off-farm income situations, prices, and yields as the study area.

Data from all 20 households were originally entered into a preliminary LP to see if the LP would model the households correctly. Validation was accomplished by examining the results from the LPs and ensuring that results were consistent with the actual household livelihood

systems. The researcher compared the LP solutions and what the household actually did to see if there were significant differences. The main areas examined were crops grown, amount of fertilizer used, and year-end cash remaining. Once validation was established, seven household LPs were studied in depth (4 FHHs and 3 MHHs) and used to test different alternatives. The goal of testing these new alternatives was to see which ones would be useful for increasing food security and cash for discretionary spending, and to discern which options would be possible for each household.

Household LP solutions initially were required to obtain the World Health Organization's (WHO's) recommended level of calories and protein (see Table 6) for each household member.[19] However, for some households, it was not possible for the model to secure the WHO nutritional requirements for each household member. (In LP terminology, these LPs "did not solve.") In these cases, the household was too cash-restricted to afford enough maize to be food-secure at these recommended levels. These households were chronically food-insecure-constantly short on food. In these cases, the calorie and protein levels were lowered to 75%, 50%, or 25% of the WHO requirements, until a feasible solution was reached (see Table 7). When these household models were used to test new technologies to improve food security, the full WHO nutritional requirements were re-introduced into the matrix (to see if the LP would "solve"). In this way, the simulation would reveal whether or not the technology raised the household into a food-secure status.

Table 6: Energy and protein requirements based on bodyweight

	Energy/day	Protein/day
Males	(kcal)[a]	(grams)
0-11months	679.8	11.9
1 to 3	1112.0	12.8
4 to 6	1454.4	16.7
7 to 9	1758.0	22.7
10 to 12	1984.4	28.6
13 to 14	2177.3	37.8
15 to 16	2435.7	46.8
17 to 18	2657.2	51.9
19 to 29	3324.8	44.3
30 to 59	3285.6	44.3
60+	2287.0	44.3

	Energy/day	Protein/day
Females	(kcal)	(g)
0-11months	628.3	11.0
1 to 3	1057.3	12.2
4 to 6	1408.5	16.9
7 to 9	1570.9	22.8
10 to 12	1805.1	30.0
13 to 14	1942.6	38.0
15 to 16	2055.1	44.1
17 to 18	2113.0	42.2
19 to 29	2315.3	39.6
30 to 59	2344.8	39.6
60+	1886.7	39.6
pregnant	1573.4	45.6
lactating	1788.4	54.9
[a]Energy/protein requirements are from WHO (1985).		

Table 7: Monthly calorie requirements of each household (HH)

% of HH calories met:	100%	75%	50%	25%
MHH1	244,567	183,417	122,278	61,139
MHH2	360,947	270,710	180,474	90,237
MHHA	246,197	184,648	123,099	61,549
FHH1	74,045	55,534	37,022	18,511
FHH2	209,264	156,948	104,632	52,316
FHH3	322,007	241,505	161,003	80,502
FHHA	513,110	384,833	256,555	128,278

Each LP had numerous activities from which to choose. Agricultural activities included growing the following: 1) local maize intercropped with cassava and pulses with either no fertilizer, 10 kg N/hectare, 20 kg N/hectare, or 40 kg N/hectare and 2) hybrid maize intercropped with cassava and pulses with either no fertilizer, 10 kg N/hectare, 20 kg N/hectare, or 40 kg N/hectare. Agricultural activities that required special (wetter) land were the following: 1) *dimba* (wetland) vegetables, 2) sugarcane, 3) rice, and 4) bananas. Non-agricultural activities

included 1) buying fertilizer, 2) off-farm employment (both male and female), 3) hiring labor, 4) purchasing maize, and 5) purchasing other foods, such as groundnuts, beans, pigeon peas, and cassava.

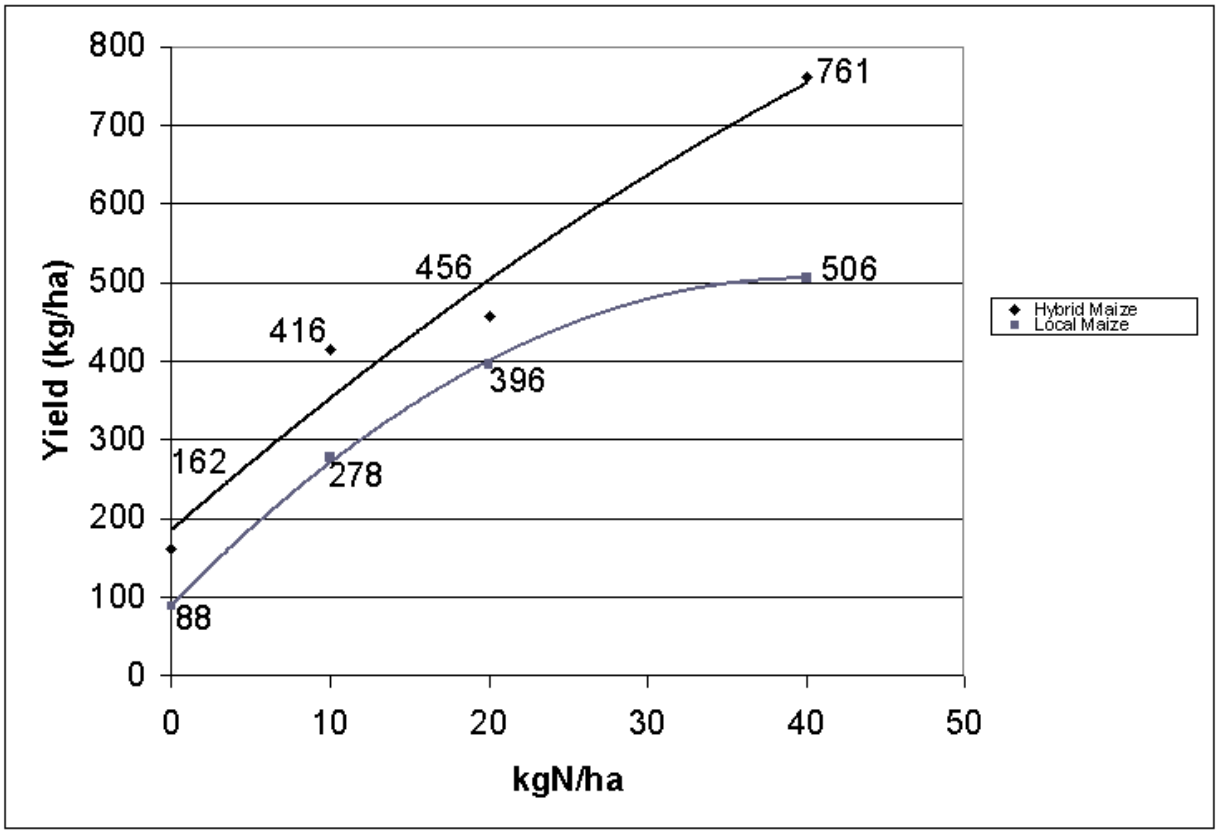
Household labor available for agricultural work was entered into the program as the maximum amount of household labor available. Cash needed for household expenses was entered as the minimum amount of cash needed for the family. This cash minimum had to be met in order for the household to run normally and for the linear program to give a feasible solution. If household cash or nutrition requirements were not met, the program would not solve. This meant that the household would not be able to function under these circumstances. The household would not be able to meet its basic food and cash needs.

Labor and cash needed for each crop grown were entered as requirements that the household must have in order to grow that crop. If the household did not meet the minimum cash and/or labor requirements, then the program would not be able to select that crop. Yields from each crop were entered as outputs from growing the crop. The amount of land available to the household was entered as the maximum amount of land available for agricultural work.

Yields were extremely low among smallholders interviewed (see Figure 1). Even with fertilizer, these maize yields were amazingly low. Other research from Malawi has recorded much higher yields; however, farmers surveyed in this research all reported extremely low yields. This area may have poorer than average soils or other conditions that cause low yields.

One farmer of special note used a fertilizer application rate of 60kg N/hectare. Her farm yielded 1365 kg/hectare of hybrid maize. She, however, was an atypical farmer in that area, because she was able to set some land aside for fallow in order to improve her yields. Because of that, her yields were probably better than what other farmers would have gotten at 60kgN/hectare. Since no other households used fertilizer at a rate greater than 40kgN/hectare, Figure 1 only shows yields at rates up to 40kgN/hectare and using 60kgN/hectare was allowed only for this particular household LP.

Figure 1: Fertilizer response of local and hybrid maize



One large problem in Malawi has been the devaluation of the Kwacha. At the time of this research in 1998, the exchange rate was K27/US$. Two months later, the rate had gone to K44/US$. By the summer of 2001, the rate had dropped to K80/US$. Recently, the Kwacha has again been appreciating, and is currently at K62/US$. Household simulations were completed at both "pre-devaluation" (K27/US$) prices and at current prices (K62/US$). Table 8 shows the difference in the two prices.

The prices for crops sold at the market were less than the prices of purchasing the same crops. This was because the households studied were selling these crops for only 26% of the market price, on average. Updated selling prices for these crops were calculated as 26% of the updated market price. The price for tobacco was a problem, however, as farmers gave varied numbers for the price that they received for selling tobacco.[20] Farmers were paid by middlemen who took the tobacco to the auction floor, and smallholders were not sure how much they would receive until after the middlemen sold the tobacco. However, since the price of tobacco is tied to the dollar, the tobacco selling price was increased accordingly, from K20/kg (the price the researcher found in 1998) to K45/kg. This may be a higher amount than farmers are actually receiving.

Table 9 shows updated income figures that were estimated using income information from more recent research.[21] Household expenses were increased at approximately the same rate as the food prices had increased (about 35%).

Table 8: Pre-Devaluation Prices vs. Current Prices

	Purchasing Price (K/kg)		Selling Price (K/kg)		Price of Inputs (K/ha grown)	
Crops:	1998 Prices	Current Prices	1998 Prices	Current Prices	1998 Prices	Current Prices
Local maize	7.6	10.0	2.3	2.6	-	-
Hybrid maize	7.6	10.0	2.3	2.6	550	2875
Groundnuts	41.5	64.0	10.0	16.6	150	225
Beans	27.1	41.4	10.0	10.8	150	225
Pigeon Peas	25.25	34.1	5.0	8.9	-	-
Cowpeas	31.1	42	4.0	10.9	-	-
Cassava	5.0	8.0	1.5	2.0	-	-
Sweet Potatoes	5.0	8.0	1.7	2.0	-	-
Tobacco	-	-	20.0	45.0	200	1390
Fertilizer (CAN), 50kg	445	680	-	-	-	-

Table 9: Income generating activities

Income Generating Activities	1998 K/hour	Current K/hour
Ganyu	2.5	3.0
Informal sector small business	8.3	10.0
Formal sector job	10.0	12.5

HOUSEHOLD INFORMATION

Five of the households chosen for modeling were poor households-three FHHs and two MHHs. Two households chosen were at the higher end of the income strata among those households surveyed; however, these two households were not rich, just in a better situation than their counterparts. One household was a MHH and one a FHH.

Since all households surveyed would be considered poor by developed country standards, the researcher made distinctions between "poor" and "non-poor" (or less poor) mainly on the basis of food security attainment and household income. A food-insecure household would automatically be in the poorest category. Also, households that were food-secure, but earned less than $100 per person in the household per year were also considered to be "poor." Some other indicators that the researcher used to determine economic status were the following. Is

the house made of mud or brick? Does the household hire *ganyu* labor or do they hire themselves out to do *ganyu* labor? Does the household hire any house servants? At what age do the children begin working on the farm (since younger children working the farm seems to indicate a tighter cash flow and inability to hire labor)? How much money does the household spend each month on non-food items? What type of non-food items do they buy-only essentials or extras? Along with food security and income information, these questions helped the researcher to determine the approximate economic status of the household.

The first MHH (MHH1) had only young children. The household consisted of a husband, a wife, a five-year-old son and a three-year-old daughter. This household farmed one hectare. They grew both local and hybrid maize intercropped with cassava and pulses. They fertilized their maize at a rate between 10 and 20kg N/hectare. The husband participated in *ganyu* work year-round, earning K500/month. The household cash requirements for non-food items were K50 per month, and the household required about 640kg of maize for the year to be food-secure, according to World Health Organization (WHO) nutritional requirements.

The next MHH (MHH2) consisted of a husband; a wife; two boys, ages thirteen and eight; and two girls, ages six and three. This household grew both local and hybrid maize with intercropped cassava and pulses, fertilized at a rate of 25kg N/hectare. Their farm was 0.8 hectares. The husband had an informal-sector job in town, and he earned about K1000/month. The household cash requirements totaled K200 per month, and the household required approximately 995kg of maize for a year.

The first FHH (FHH1) had no children in the labor pool; the household consisted only of the woman and her nine-month-old son. She had an extremely small farm, only 0.06 hectares. She grew both local and hybrid maize, intercropped with cassava and pulses, with 40kg N/hectare. The application rate of fertilizer was high because her farm was extremely small, so a very small application of fertilizer resulted in a large nitrogen rate per hectare. This household head participated in *ganyu* work in April, May, and June for 65 hours each month, earning about K165/month worked. She also received a small remittance of about K75/month from a relative. Her household required K40/month for expenses, and about 200kg of maize each year to be food-secure.

The next FHH (FHH2) consisted of the female head of the household and her two daughters, age 25 and 20. (She had had several other children, but they had recently died.) They grew 0.5 hectares of local maize intercropped with cassava and pulses. They applied about 20kg N/hectare of fertilizer to their maize. The head of the household sold firewood for income on some Saturdays, and she earned about K240/month. Household expenses totaled approximately K70/month, and food requirements were 695kg of maize per year.

The final low-income FHH (FHH3) consisted of the female household head, her 22-year-old brother, her 16-year-old son, and her two daughters who were nine and two years old. They farmed 0.2 hectares and grew hybrid and local maize intercropped with cassava and pulses. This household used no fertilizer. The household head and her son sold firewood on Saturdays, earning about K400/month. The household required K75/month for household expenses, and required about 1000kg of maize per year to be food-secure, according to WHO nutritional requirements.

The higher income MHH (MHHA) consisted of the male head of the household, his wife, and two sons, ages four and two. They grew 0.75 hectares of local maize intercropped with cassava and pulses. They fertilized at a rate of 25kg N/hectare. Both the husband and wife were teachers, earning a combined income of about K3200/month. Household expenses totaled K350/month; food requirements for the household were 815kg of maize per year.

The higher income FHH (FHHA) consisted of the female head; her daughter, age 30; three grandsons, ages 15, 13, and 12; one granddaughter, age 18; and two orphaned boys who lived with the family, ages 14 and 12. They grew 0.3 hectares of both local and hybrid maize, intercropped with cassava and pulses, fertilized at a rate of 60kg N/hectare. They had 0.25 hectares in fallow to improve maize yields. This female head had two older sons who brought income into the household. One son had a business, bringing K1300/month into the household. The other son sent a remittance of about K500/month to help with household expenses. The household had about K1200/month in expenses, and required 1710kg of maize each year.

HOUSEHOLD MODELS AND OPTIONS TESTED

These households were first modeled in LPs with pre-devaluation prices; next, households were modeled with current prices to see the difference the devaluation made in these households. After that, several options were introduced into the models for the five poorer households in order to test their value in improving household food security at current prices.

The differences between the solutions for pre-devaluation prices and current prices can be seen in Tables 10 and 11. Although activities performed and crops grown in each household do not change significantly, there are some very important differences in the outcomes. In the original, pre-devaluation, prices, all of the MHHs are able to meet household food and cash requirements. However, three of the four FHHs are not able to meet all food and cash requirements; only 75% of their food requirements for the year are met. FHHA is able to meet all requirements. Using the new prices, two of the three MHHs are still able to meet all requirements; however, they both have significantly less cash left at the end of the year for discretionary purchases. Although FHHA is a higher income household, it is still only able to meet 50% of the food needs for the household with the current prices. However, this is better than the other FHHs, who all are only able to meet 25% of household food requirements. The two higher income households, MHHA and FHHA, are clearly less affected by the price changes than the other households. All of the FHHs had more difficulty surviving the devaluation than did their counterpart MHHs.

Table 10: Pre-Devaluation Prices vs. Current Prices: MHHs

	MHH1		MHH2		MHHA	
Prices:	1998	Now	1998	Now	1998	Now
Food Requirement Met:	100%	75%	100%	100%	100%	100%
Activities						

Local maize-0kgN/ha (ha grown)	-	-	-	-	-	-
Local maize-10kgN/ha	-	0.30	-	-	-	-
Local maize-20kgN/ha	1.00	0.70	0.80	0.60	0.27	0.20
Local maize-40kgN/ha	-	-	-	0.20	-	0.40
Local maize-60kgN/ha	-	-	-	-	-	-
Hybrid maize-0kgN/ha (ha grown)	-	-	-	-	-	-
Hybrid maize--10kgN/ha	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	0.12	-
Hybrid maize--60kgN/ha	-	-	-	-	-	-
Total maize purchased	280	98	706	672	500	401
Avg. hrs/mo of male cash activity	150	150	120	120	120	120
Avg. hrs/mo of female cash activity	-	-	-	-	120	93
Cash earned per month--male	500	600	1000	1250	1600	2000
Cash earned per month--female	-	-	-	-	1600	2000
Remittance K/mo.	-	-	-	-	-	-
Fertilizer Purchased (kg)	100	85	80	100	50	100
Total ending cash (K)	3077	3878	6952	4185	21814	21760
Total ending cash (US$)	114	63	258	68	808	351

Table 11: Pre-Devaluation Prices vs. Current Prices: FHHs

	FHH1		FHH2		FHH3		FHHA	
Prices:	1998	Now	1998	Now	1998	Now	1998	Now
Food Requirement Met:	75%	25%	75%	25%	75%	25%	100%	50%
Activities								
Local maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-
Local maize-10kgN/ha	-	-	-	0.50	-	-	-	-
Local maize-20kgN/ha	0.06	0.02	0.50	-	0.20	0.20	-	-
Local maize-40kgN/ha	-	0.04	-	-	-	-	-	-
Local maize-60kgN/ha	-	-	-	-	-	-	-	-
Hybrid maize-0kgN/ha (ha grown)	-	-	-	-	-	-	-	-

Hybrid maize--10kgN/ha	-	-	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	-	-	-	-
Hybrid maize--60kgN/ha	-	-	-	-	-	-	0.30	0.30
Total maize purchased	122	18	242	-	857	132	1097	313
Avg. hrs/mo of male cash activity	-	-	-	-	20	20	160	160
Avg. hrs/mo of female cash activity	16	16	20	20	20	20	-	-
Cash earned per month-male	-	-	-	-	-	-	-	-
Cash earned per month-female	41	54	200	240	400	480	1300	1600
Remittance K/mo.	75	90	-	-	-	-	500	600
Fertilizer Purchased (kg)	5	10	50	25	20	20	100	100
Total ending cash (K)	527	933	1007	6334	161	3096	4223	3146
Total ending cash (US$)	20	15	37	102	6	50	156	51

In order to deal with these changes, households will no doubt adopt different strategies of coping. In this paper, five options to deal with these changes have been introduced into each of the five low-income households. The first two represent intervention from an outside organization, governmental or NGO. These options are a maize safety net and a fertilizer safety net. The last three options each introduce a different income-generating activity: growing tobacco as a cash crop; increasing hours of off-farm work; and taking out a loan for a small business.

The first option introduced is a maize safety net (50kg of maize), simulating a food relief program. Table 12 shows the difference between this option ("maize net") and the simulation with current prices and no intervention ("none"). This option increases food security some for the FHHs. All three FHHs are now able to meet 50% of their household food requirements; however, they are still chronically food-insecure. Both MHHs are in a slightly better situation as well.

Table 12: Maize Safety Net

	MHH1		MHH2		FHH1		FHH2		FHH3	
Option Tested:	None	Maize Net	None	Maize Net	None	Maize Net	None	Maize Net	None	Maize Net
Food Requirement Met:	75%	75%	100%	100%	25%	50%	25%	50%	25%	50%
Activities										

Local maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Local maize--10kgN/ha	0.30	0.30	-	-	-	-	0.50	0.30	-	-
Local maize--20kgN/ha	0.70	0.70	0.60	0.60	0.02	0.02	-	0.20	0.20	0.20
Local maize--40kgN/ha	-	-	0.20	0.20	0.04	0.04	-	-	-	-
Hybrid maize--0kgN/ha(ha grown)	-	-	-	-	-	-	-	-	-	-
Hybrid maize--10kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	-	-	-	-	-	-
Total maize purchased	98	48	672	622	18	15	0	49	132	328
Avg. hrs/mo of male cash activity	150	150	120	120	-	-	-	-	20	20
Avg. hrs/mo, female cash activity	-	-	-	-	16	16	20	20	20	20
Cash earned per month-male	600	600	1250	1250	-	-	-	-	-	-
Cash earned per month-female	-	-	-	-	54	54	240	240	480	480
Remittance K/mo.	-	-	-	-	90	90	-	-	-	-
Fertilizer Purchased (kg)	85	85	100	100	10	10	25	35	20	20
Total ending cash (K)	3878	4378	4185	4685	933	932	6334	5432	3096	1136
Total ending cash (US$)	63	71	67	76	15	15	102	88	50	18

The fertilizer safety net ("fert. net") also simulates a relief program, giving 25kg of fertilizer to each household. This option marginally improves the situation of all households, but it does not make a substantial improvement (see Table 13). The maize safety net improves the situation more than the fertilizer safety net. This is likely because the increase in the cost of hybrid seeds has made it difficult for these farmers to purchase hybrid seeds. Although extra fertilizer is helpful in improving yields for local maize, it does not improve local yields as much as hybrid yields. An addition of a small amount of hybrid maize seed to the safety net (as was done in the starter packs distributed recently in Malawi) would likely improve food security substantially more than the fertilizer alone.

Table 13: Fertilizer Safety Net

	MHH1		MHH2		FHH1		FHH2		FHH3	
Option Tested:	None	Fert. Net	None	Fert. Net	None	Fert. Net	None	Fert. Net	None	Fert. Net

Food Requirement Met:	75%	75%	100%	100%	25%	25%	25%	25%	25%	50%
Activities										
Local maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Local maize--10kgN/ha	0.30	-	-	-	-	-	0.50	0.50	-	-
Local maize--20kgN/ha	0.70	1.00	0.60	0.35	0.02	-	-	-	0.20	0.15
Local maize--40kgN/ha	-	-	0.20	0.45	0.04	0.06	-	-	-	0.05
Hybrid maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Hybrid maize--10kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	-	-	-	-	-	-
Total maize purchased	98	63	672	644	18	16	-	-	132	373
Avg. hrs/mo of male cash activity	150	150	120	120	-	-	-	-	20	20
Avg. hrs/mo of female cash activity	-	-	-	-	16	16	20	20	20	20
Cash earned per month-male	600	600	1250	1250	-	-	-	-	-	-
Cash earned per month-female	-	-	-	-	54	54	240	240	480	480
Remittance K/mo.	-	-	-	-	90	90	-	-	-	-
Fertilizer Purchased (kg)	85	75	100	100	10	-	25	-	20	-
kg fert used from 25 safety net	-	25	-	25	-	12	-	25	-	25
Total ending cash (K)	3878	4368	4185	4460	933	1091	6334	6674	3096	963
Total ending cash (US$)	63	70	67	72	15	18	102	108	50	16

Although the fertilizer would be helpful to farmers, some farmers may sell the fertilizer if they are in a financial difficulty. The problem is that they typically will sell it for much less than its value. Some Malawian farmers were observed to be selling their starter packs for K150-200 even though the packs were valued at K450 (Gough, personal communication 2001). They were selling the fertilizer, 5kg of "23:21 0+4S" and 10kg of urea, for K100.

The next option examined how the households would fare if they sold the fertilizer that they were given. The selling price for the fertilizer was set at K100, even though they would be selling 25kg of fertilizer, since this option was considering CAN fertilizer, which is less valuable than "23:21" or urea. This simulation shows that the money may help the households in the short run; however, over the course of a year, the households are basically not any better off than if they were not given the fertilizer (see Table 14).

Table 14: Fertilizer Safety Net and Selling Fertilizer

	MHH1		MHH2		FHH1		FHH2		FHH3	
Option Tested:	None	Sell Fert. Net	None	Sell Fert. Net	None	Sell Fert. Net	None	Sell Fert. Net	None	Sell Fert. Net
Food Requirement Met:	75%	75%	100%	100%	25%	25%	25%	25%	25%	25%
Activities										
Local maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Local maize--10kgN/ha	0.30	0.30	-	-	-	-	0.50	0.50	-	-
Local maize--20kgN/ha	0.70	0.70	0.60	0.60	0.02	0.02	-	-	0.20	0.20
Local maize--40kgN/ha	-	-	0.20	0.20	0.04	0.04	-	-	-	-
Hybrid maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Hybrid maize--10kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	-	-	-	-	-	-
Total maize purchased	98	98	672	672	18	18	-	-	132	132
Avg. hrs/mo of male cash activity	150	150	120	120	-	-	-	-	20	20
Avg. hrs/mo of female cash activity	-	-	-	-	16	16	20	20	20	20
Cash earned per month-male	600	600	1250	1250	-	-	-	-	-	-
Cash earned per month-female	-	-	-	-	54	54	240	240	480	480
Remittance K/mo.	-	-	-	-	90	90	-	-	-	-
Fertilizer Purchased (kg)	85	85	100	100	10	10	25	25	20	20
Fertilizer sold (kg)	-	25	-	25	-	25	-	25	-	25
Total ending cash (K)	3878	3978	4185	4285	933	1033	6334	6434	3096	3196
Total ending cash (US$)	63	64	67	69	15	17	102	104	50	52

The final three options tested implementing specific changes to the households' livelihood systems. The first change tested was introducing a tobacco loan option into the system. This allowed farmers to take out a loan for fertilizer to grow tobacco. The model simulates the households repaying the loan at 35% interest by selling the tobacco. Any tobacco left over after repaying the loan is "sold" for cash for the household. This tobacco sale is noted in Table 15.

In this simulation, both MHHs "choose" to take out a loan and grow tobacco. This improves the situation of both households, although MHH1 is still not food-secure. Two of the three FHHs "choose" to grow tobacco. Both of these households (FHH2 and FHH3) are now able to meet 50% of their household nutritional needs instead of only 25%. FHH1 does not grow tobacco in this simulation, probably due to a lack of land and labor.

It is interesting to note that the two FHHs who chose to grow tobacco, as well as one of the MHHs took out a loan to grow a specific area of tobacco (0.3 ha for FH2, 0.12ha for FHH3, and 0.08ha for MHH1) and then only grew tobacco on about half that amount of land. The fertilizer saved from doing this was applied to maize. These households were helped by the cash from tobacco sold as well as from the extra maize yield.

Comparing the differences between the amount of improvement that the MHHs experienced from this option and the amount of improvement for the FHHs is difficult, since 50% of nutritional requirements will mean different amounts of calories for different household compositions. However, the researcher attempted to measure the total gain each household achieved from this option, converting extra food purchased or grown to a dollar amount. When these numbers were compared for this scenario, there was no real difference between the gain for MHHs and the gain for FHHs. (See Figure 2.)

Table 15: Tobacco Loan Option

	MHH1		MHH2		FHH1		FHH2		FHH3	
Option Tested:	None	Tob. Credit	None	Tob. Credit	None	Tob. Credit	None	Tob. Credit	None	Tob. Credit
Food Requirement Met:	75%	75%	100%	100%	25%	25%	25%	50%	25%	50%
Activities										
Local maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Local maize--10kgN/ha	0.30	-	-	-	-	-	0.50	-	-	-
Local maize--20kgN/ha	0.70	0.95	0.60	0.23	0.02	0.02	-	-	0.20	-
Local maize--40kgN/ha	-	-	0.20	0.39	0.04	0.04	-	0.34	-	0.13
Hybrid maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Hybrid maize--10kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	-	-	-	-	-	-
Total maize purchased	98	83	672	745	18	18	-	90	132	380
Tobacco credit (for X no. of ha)	-	.08	-	0.19	-	-	-	0.30	-	0.12
Tobacco--ha grown	-	.05	-	0.19	-	-	-	0.16	-	0.07
Tob. Kg sold after loan repayment	-	32	-	147	-	-	-	101	-	49
Avg. hrs/mo of male cash activity	150	150	120	120	-	-	-	-	20	20

Avg. hrs/mo of female cash activity	-	-	-	-	16	16	20	20	20	20
Cash earned per month-male	600	600	1250	1250	-	-	-	-	-	-
Cash earned per month-female	-	-	-	-	54	54	240	240	480	480
Remittance K/mo.	-	-	-	-	90	90	-	-	-	-
Fertilizer Purchased (kg)	85	80	100	100	10	10	25	-	20	-
Total ending cash (K)	3878	4555	4185	8094	933	933	6334	7794	3096	1691
Total ending cash (US$)	63	73	67	130	15	15	102	126	50	27

Allowing household members to participate in increased off-farm work improves the situation for all five households, as shown in Table 16. This option allows FHH2, FHH3, MHH1, and MHH3 to work 20% more hours each month, since these households work off-farm almost year round. FHH1 only works 3 months out of the year in *ganyu*, so increasing her off-farm work is simulated by allowing her to work 5 months out of the year in *ganyu*. All three FHHs are raised to being able to meet 50% of their food requirements-not food secure, but closer to it. The MHHs are also helped by the extra off-farm work. The increased off-farm work does not seem to be more helpful for one household type than the other.

Table 16: Increased Off-Farm Work

	MHH1		MHH2		FHH1		FHH2		FHH3	
Option Tested:	None	Off-Farm Work	None	Off-Farm Work	None	Off-Farm Work	None	Off-Farm Work	None	Off-Farm Work
Food Requirement Met:	75%	100%	100%	100%	25%	50%	25%	50%	25%	50%
Activities										
Local maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Local maize--10kgN/ha	0.30	-	-	-	-	-	0.50	-	-	-
Local maize--20kgN/ha	0.70	1.00	0.60	0.60	0.02	0.02	-	0.50	0.20	0.20
Local maize--40kgN/ha	-	-	0.20	0.20	0.04	0.04	-	-	-	-
Hybrid maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Hybrid maize--10kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	-	-	-	-	-	-
Total maize purchased	98	236	672	672	18	65	-	64	132	378

Avg. hrs/mo, male cash activity	150	180	120	144	-	-	-	-	20	24
Avg. hrs/mo, female cash activity	-	-	-	-	16	27	20	24	20	24
Cash earned per month-male	600	720	1250	1440	-	-	-	-	-	-
Cash earned per month-female	-	-	-	-	54	81	240	288	480	576
Remittance K/mo.	-	-	-	-	90	90	-	-	-	-
Fertilizer Purchased (kg)	85	100	100	100	10	10	25	50	20	20
Total ending cash (K)	3878	3117	4185	7065	933	822	6334	5658	3096	1788
Total ending cash (US$)	63	50	67	114	15	13	102	91	50	29

The final option introduces credit for a small business into the household. The business requires a K1920 loan at the beginning of the year, repaid at the end of the year with 35% interest. The business is modeled to pay K400/month for 50 hours of labor per month, K800/month for 100 hours of labor, and K1200/month for 150 hours of labor. In the simulation, the three FHHs are all restricted to a maximum of 100 hours/month, because they are currently working much less than that, and they have other household responsibilities. In the simulation for MHH1, the husband is allowed to work up to 150 hours/month, since he is working that many hours already. In these four households, working *ganyu* labor or other informal work in addition to the new small business was not permitted in the LP. Although the LP may find enough labor for the household members to continue to perform their old off-farm work as well, in reality, households would not be likely to do this. In MHH2, the husband already has an informal job that earns more money than the credit business option, so the loan is introduced as an option for his wife. She "chooses" to work only 42 hours/month for the business, while the husband continues to work at his old business.

This option improves all the households' situations, as shown in Table 17. Two of the three FHHs are now food-secure, meeting 100% of their food requirements. The third FHH is able to meet 50% of her requirements. Both MHHs are food secure and both are helped by this option. Again, no real difference is seen between the amount of improvement for MHHs verses FHHs.

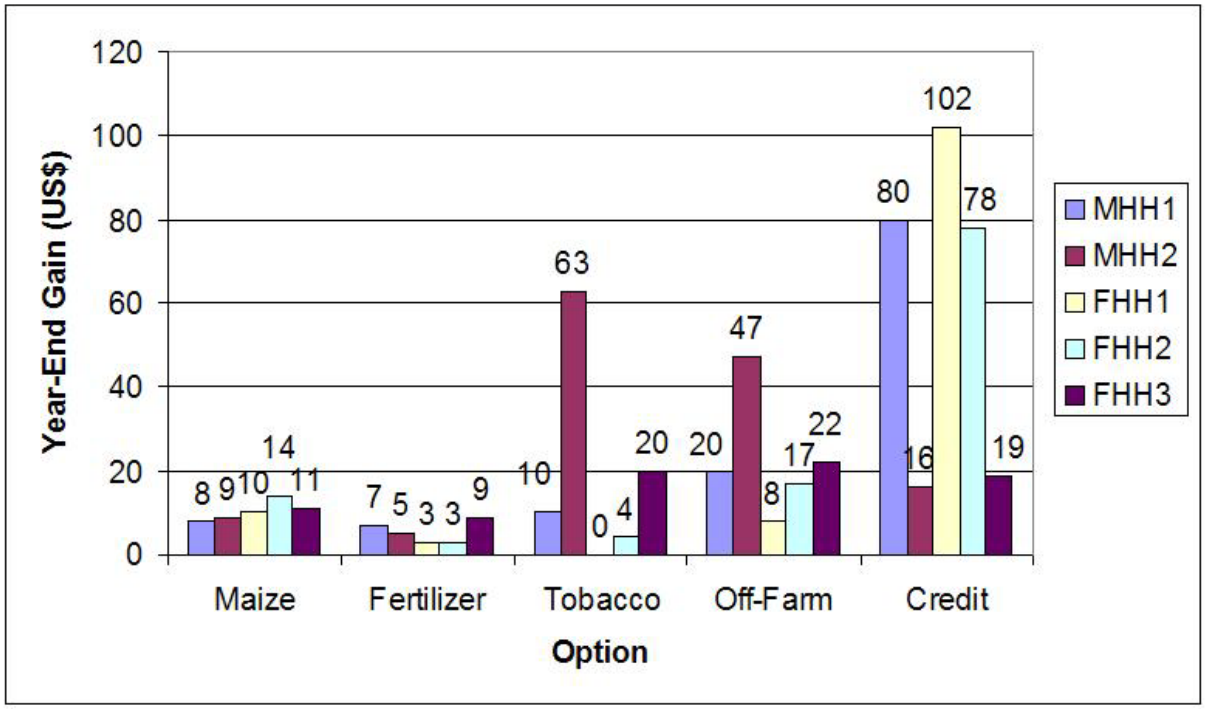
Table 17: Credit for a Small Business

	MHH1		MHH2		FHH1		FHH2		FHH3	
Option Tested:	None	Small Bus. Credit	None	Small Bus. Credit	None	Small Bus. Credit	None	Small Bus. Credit	None	Small Bus. Credit
Food Requirement Met:	75%	100%	100%	100%	25%	100%	25%	100%	25%	50%
Activities										

Local maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Local maize--10kgN/ha	0.30	-	-	-	-	-	0.50	-	-	-
Local maize--20kgN/ha	0.70	1.00	0.60	0.20	0.02	-	-	0.50	0.20	0.09
Local maize--40kgN/ha	-	-	0.20	0.40	0.04	0.06	-	-	-	0.08
Hybrid maize--0kgN/ha (ha grown)	-	-	-	-	-	-	-	-	-	-
Hybrid maize--10kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--20kgN/ha	-	-	-	-	-	-	-	-	-	-
Hybrid maize--40kgN/ha	-	-	-	-	-	-	-	-	-	-
Total maize purchased	98	236	672	752	18	175	-	336	132	386
Avg. hrs/mo, male cash activity	150	-	120	120	-	-	-	-	20	-
Avg. hrs/mo, female cash activity	-	-	-	-	16	-	20	-	20	-
Avg. hrs/mo for business-male	-	150	-	-	-	-	-	-	-	-
Avg. hrs/mo for business-female	-	-	-	50	-	100	-	100	-	100
Cash earned per month-male	600	1200	1250	1250	-	-	-	-	-	-
Cash earned per month-female	-	-	-	336	54	800	240	800	480	800
Remittance K/mo.	-	-	-	-	90	90	-	-	-	-
Fertilizer Purchased (kg)	85	100	100	100	10	25	25	50	20	25
Total ending cash (K)	3878	6802	4185	5176	933	5404	6334	5957	3096	1633
Total ending cash (US$)	63	110	67	83	15	87	102	96	50	26

Figure 2 is a summary chart of the amount of improvement each household received from each option. To make comparisons easier, increases in food security have been converted to dollar amounts of food that would have been purchased. Any extra money as a result of the option was added to that amount. In this way, comparing an option which increased FHH1 from 25% to 50% food secure can easily be compared with an option which did not increase the food security of MHH1, but increased the household's cash left at the end of the year. The chart represents the total amount of household improvement from each option.

Figure 2: Amount of gain from each option



DISCUSSION OF LP RESULTS AND CONSTRAINTS TO IMPLEMENTING OPTIONS

The differences between the simulations run at 1998 prices and current prices show that the devaluation of the Kwacha has likely been harmful to smallholder farmers in the Malosa area. The simulations show that food security has probably decreased greatly by this change. FHHs especially would be affected, because they have smaller landholdings and lower paying off-farm work. Households with increased income opportunities (such as MHHA and FHHA) would be less affected by these changes.

Of the three household intervention options-growing tobacco, increased off-farm work, and a loan for a small business-the loan for a business appears to increase household food security the most. Increased off-farm work could also be helpful in increasing food security. The tobacco loan option was also able to improve food security a good deal for some households.

Although growing tobacco seems to have the potential to improve household food security, the researcher found a few basic drawbacks to growing tobacco. The first is that tobacco requires a great deal of labor, and households (especially small households) often have to hire labor to grow tobacco. The second problem is the large start-up cost associated with tobacco. Although farmers are able to take out a loan to cover these expenses, many still do not wish to incur this expense. The third problem with tobacco is that in order to grow tobacco, a farmer must belong to a tobacco club, which requires the farmer to grow at least 0.1ha of tobacco, and requires the farmer to pay club fees. The variation in the price received after the tobacco is

taken to the auction floor is a final drawback. Several of the households interviewed indicated that they did not want to grow tobacco because it required too much labor.

Increasing off-farm work appears to be a good strategy for increasing food security in the Malosa area. However, during the study, the most frequently cited reason for not participating in more off-farm work, and in particular *ganyu* labor, was that work was scarce. If more work were available, this would be a fairly easy opportunity to raise a household's food security and year-end cash. Bringing formal employment into the area may primarily help MHHs, since very few FHHs are formally employed, so introducing new opportunities to participate in informal-sector work and small businesses may be a good way to help FHHs in the Malosa area.

According to the LP simulations, the option to use credit to start a small business was the best option tested for increasing food security. This option allows households to earn more cash for food purchase, and in the LP models, provides food security for all households except one. Having access to credit seems to have the potential to be beneficial to households of the Malosa area.

Although credit was the option that increased food security the most in the simulations, the field research showed that there were, in real life, a few drawbacks to this option. One was that it was difficult to gain access to a credit source. In order for a smallholder to obtain credit, he or she was required to belong to a credit club. Credit clubs often required fees and meeting participation. Another problem was that many people were afraid of credit. However, eight households surveyed who did not have credit stated that they would like to have credit to start a business. This shows that there are some households who would be interested in credit, and that credit, if made more widely available, could be an effective tool to raise households in this area into food security.

The safety net options were modeled to show the effect of a short-term intervention by an organization, either governmental or NGO. The maize safety net could give 50kg of maize to the household, while the fertilizer safety net could give 25kg of fertilizer to the household. Both options helped to increase food security, although the maize safety net improved food security to a greater extent.

RECOMMENDATIONS

There are four main recommendations arising from this research. The first is to continue making credit programs available to the rural poor in the Malosa area, taking care not to exclude FHHs. This option has the potential to improve household food security. The small business run by the son in FHHA was started by a small business loan. They have now had the business for 10 years and are much more food secure than the other three FHHs studied in this paper.

The second recommendation is to research the feasibility of smallholder farmers in the Malosa area using credit to grow tobacco. Research should be done to determine if farmers in this area would benefit in real life from planting tobacco on a small area of their land. Also, the willingness of farmers in the area to grow tobacco should be researched further.

The third recommendation is to research the possibility of introducing increased opportunities for off-farm work in rural areas. Households who participated in *ganyu* work often remarked that *ganyu* was scarce. Households selling firewood were only able to do so for about 10 hours each week (maximum), because there was a relatively fixed demand for firewood. Households need access to other types of off-farm income opportunities in the rural areas.

The final recommendation is to research providing safety nets to the poorest households in the short-run. Safety net programs can be productivity-enhancing programs, such as food-for-work or input-for-work programs. These are different than subsidizing prices, because they focus on the poorest households and do not disrupt the market.

Conclusion

Diversification of household activities is a key factor to household food security. In Malawi, farms are not large enough for households to be food secure from subsistence farming alone. Cash cropping and off-farm work are important parts of the system. In the area studied, off-farm income was highly important to the livelihood system. Households with more access to income generating activities, or access to higher paying work were more food secure than households who did not have these benefits. In particular, FHHs were more food insecure than MHHs because they had smaller land holdings, less labor available for on-farm and off-farm work, and lower paying off-farm work. Helping these households achieve food security will require more than just improving subsistence agriculture. Policy makers should complement the research aimed at improving agricultural yields of food and cash crops with programs focused on increasing the off-farm work available to smallholder farming households. Safety net programs, such as the starter pack program and food-for-work or input-for-work programs should continue to be encouraged for the poorest households.

Notes

1. CIA
2. Sahn and Arulpragasam
3. GOM and UNICEF
4. CIA
5. Gladwin et al.
6. GOM and UNICEF
7. GOM and UNICEF
8. Thompson and Metz
9. Gladwin and Thomson
10. Gladwin and Thomson
11. Hildebrand, 1998
12. Gladwin and Thomson
13. Commonwealth Secretariat
14. Spring, 1995

15. Spring, 1992
16. Gladwin and Thompson
17. Uttaro
18. Hildebrand, 2001
19. WHO
20. Gough
21. Gough

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