University of Malawi

Centre for Social Research

'African Food Crisis: The Relevance of Asian Models'

Malawi Micro-study Country Report – Round II

By

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Foreword

This report is from second round of data collection in a study aimed at assessing how households in Africa (including Malawi) are intensifying in their agricultural production. First round of data collection took place in 2002 while second round took place five years later in 2007. Concern for Africa's food insecurity is continuously growing perhaps following what Malthusian theory stipulated about the world's prospects to feed the ever-rising population. This research argues in support of the opponents of the Malthusian theory (Paarlberg for example, see Caliendo 1979) who have made projections that food supplies can be expected to improve if certain conditions are met: scientific knowledge and technology are wisely applied; population growth is slowed, economic advances are made; and governments see the need for change, and they correct inequities in production, distribution and consumption functions.

Through studying the Asian models of agricultural development, African nations may be able to initiate changes on the roles of the triad: 'state, markets and the farmers', (which were central in the Asian agricultural development), in agricultural development. It was through such modifications that some Asian economies which used to be perpetually food insecure to move to being food self-sufficient and exporters of extra food. This study, which is being coordinated by the Department of Sociology at the Lund University, is being carried out in eight African countries namely: Ghana, Ethiopia, Kenya, Nigeria, Malawi, Uganda, Zambia and Tanzania.

There are three main components which make up the study: A review of Asian agricultural development models being done by the Department of Sociology at the Lund University; A study of relevant policy changes that have taken place in the eight countries which have impacted on their food security (macrostudy); and, lastly, a study of the farmer's level of intensification and productivity (microstudy).This report is based on the microstudy component of the research in Malawi.

Executive Summary

Centre for Social Research of the University of Malawi has since 2002 been part of a multinational study on the prospects for agricultural intensification among smallholder farmers, led by the University of Lund in Sweden (see: http://blog.sam.lu.se/afrint/). Data collection for the study has taken place twice, in 2002 and 2007. In both rounds, data collection has involved review of policies ad research findings and interviews with approximately 400 smallholder farmers drawn from 8 extension planning areas of the country (refer to the methodology section regarding issues of sampling). This report presents a summary of findings mainly from the household interviews. Findings from the review of policies and previous research are reported separately from these household level findings.

Findings

Findings from this study on the prospects for intensification have generally suggested that awareness of various farming techniques/methods that would improve yields is generally very high among the households. Over 70% of the respondents responded positively to over three quarters of the techniques that were asked except for rain water harvesting which attracted a 'yes' response of 24% and integrated pest management (10%). However, despite these high levels of awareness, the mismatch between knowledge and adoption is wide. Adoption was found at one third the levels of awareness and this is mainly arising from economic reasons, constraints with landholdings and limited access to institutional support (extension and credit). Access to both public and private extension services were decimal in the 2006/07 farming season (similar findings also reported in 2002) and households that reported knowing modern methods of farming learnt them mainly through family and community networks (>70% of the cases) whereas NGOs and extension services were accessed by ~12-20% of the households and worse so for the radio/TV (<1%). In a country where literacy levels are so low (~60%) especially among females (~40%) than males (~70-75%), the provision of extension services is arguably one of the conditions for adoption of modern methods of farming and intensification. However, the report further argues that provision of extension messages alone cannot improve intensification if the challenges to their adoption (mainly economic) are not addressed. Do smallholder farmers have any more trust in modern farming techniques? Is the drop in adoption rates only economic related or that the mistrust with extension services is widening? It would be good to explore better extension packages that would enhance adoption of modern methods of farming in addition to addressing the barriers discussed in this report.

Maize will remain the main staple for Malawi for the foreseeable future (confirmed by the findings of this study), as such, any policies that increase or decrease its production or availability have a direct bearing on the food situation in Malawi. There has been some dropping of cassava (9%), rice (3%) and non-food cash crops (~20%) between 2002 and 2007 mainly on economic reasons (resulting from dissatisfaction with produce prices vis-à-vis levels of investment – time, labour and inputs). This is a clear message that with dissatisfaction, households would switch their growing patterns to something deemed more profitable.

Over the years of the study and retrospective data collection (2000-2007), household maize production has been undulating, mainly following national trends as well. Yield achievement by the households against what is feasible under research conditions has generally been very low (<20% achievement). In general the yields in the surveyed households scrambled in 2001/02 (when Malawi experienced the worst food shortage in modern times) and in 2005 and the findings from this study have suggested that households have not recovered from these shocks into 2007. Further research is needed to find mechanisms that would aid households to recover quickly from food production shocks. This raises questions as whether the various safety net programmes, community empowerment programmes are really

empowering programmes and whether the input subsidy programme (targeted) is one such mechanism (considering the target groups).

Markets are expected to drive production of commodities if prices are better (*ceteris paribus*). In the present study, the findings have shown that generally, prices at which households sold maize was generally higher than the official price in ADMARC (~US$13.6 to US$15.2 per 100kg on average in 2006 and 2007, respectively compared to US$8.58 per 100kg set by the government). Ideally, this rise in the prices in 2005/06 was expected to have triggered production in 2007 but this was not the case as production stagnated in the same period. The high prices therefore reflect scarcity of the commodity rather than better marketing conditions provided by the vendors. The eventual demise of ADMARC is also reflected in the modest proportions of households that sold their maize produce through the parastatal organisation in 2007 and the years preceding this. The challenges of having absence of a government-led organisation would be felt in years when farmers will produce more than has been the case in the years of observation of this study. The market will be over-flooded with maize and vendors will offer lesser prices than have been the case in 2006/07 the end result being discouraging farmers to produce more in subsequent years, eventually returning to low food availability in the country. Encouraging rural-urban and rural-rural linkages is another viable option but needs proper investments to address challenge that smallholder farmers face with regard to transport and storage. Further research is needed to explore better ways of preserving farm produce so that it can be transported to other parts of the country without losing form and quality too much.

This research study therefore recommends measures and further research that would generate better ways of providing formal extension services to the smallholder farmers considering the existing literacy and poverty levels. It would be argued that Malawi has rushed to start implementing a demand-driven extension system. Furthe research is also needed to understand the mismatch between knowledge and adoption of modern techniques besides economic reasons, constraints with landholdings and limited access to institutional support (extension and credit). There is generally need to revitalise the role of ADMARC as a price stabilising body.

Acknowledgements

Several people and institutions contributed to the success of this survey in many forms for which they need to be acknowledged. Firstly, I would like to acknowledge the contributions of the various respondents and staff from the four Rural Development Programmes (viz. Blantyre, Thiwi/Lifidzi, Bwanje Valley and Ntchisi RDPs) for welcoming me and the entire research team to their areas and for giving us all the support that we required during the entire period of the study. I will in my carrier fail if I do not specifically mention village headmen, Development Officers from the eight Extension Planning Areas (EPAs) and Rural Devlopment Officers (RDOs) from the RDPs. It would be very difficult without your support to fid the households that we interviewed in 2002.

My second lot of appreciation goes to the research team comprising Augustine Harawa, Sefra Kambanizithe, Enelesi Chilenje, Lucky Ndimbwa, Keisha Nyirendaa, Harry Nkata, Owen Chawantha, Mac Jones Mwale and Mr. Kazembe (the Driver) for their assistance during the data collection phase. In the same token, I also extend my thanks to the data entry Manager and clerks at the CSR and to the CSR secretarial team for the timely completion of work. Thirdly, my thanks go to the Director of CSR, Dr. Charles Chilimampunga for his support during the execution of the study.

Lastly, my special thanks go to members of the Swedish team for their timely guidance and responses to all our enquiries during the execution of this study and also for being very patient in waiting for the results of the study. I take responsibility for any mistakes that may arise in the interpretation of the data that was collected in this study.

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Definitions of Terms used in the Report

Breaking the Hard Pan	'Breaking the hard pan' refers to farmers' attempts of breaking the hard pan that tends to develop some 10-15 cm below the surface after several years of uninterrupted cultivation. Breaking this hard pan, either manually by the hoe or by plough ripping, helps retain water and the roots to infiltrate the soil.
Crop Rotation	The practice of changing crops grown on a piece of land from year to year with the purpose of fertility regeneration. The practice is called 'improved crop rotation' if crops are interchanged between cereals and legumes
Farm Manager	A farm manager was defined as the person who decides about land and crop use etc. Most often this is the same person as the head of household but exceptions were expected.
Improved Fallowing	'Improved fallowing' was defined as planting leguminous crops/ trees on a field for two or three years before beginning to grow traditional crops again. During the fallow period, they will provide fodder and firewood (if e.g. pigeon peas, food as well), at the same time as they bring up important nutrients to the soil surface, which the traditional crops otherwise would not be able to reach. The roots and leaf material will add organic matter to the soil as they decompose. Trees also help to protect the soil from harsh rains and erosion.
Improved planting practices	'Improved planting practices' refers to e.g. cropping on raised soil beds or rows. It also refers to reduced tillage practices
Integrated nutrient management	'Integrated nutrient management' (INM) is a strategy concerning techniques to conserve and add to the nutrient reserves of the soil through the balanced application of organic or inorganic fertilizers. The goal is to attain higher crop productivity and prevent soil degradation. INM also includes making nutrient uptake more efficient by using new techniques such as deep placement of fertilizers to prevent losing nitrogen into the atmosphere through volatilization.
Integrated pest management	'Integrated pest management' (IPM) refers to a pest control strategy that use e.g. natural predators, pest-resistant varieties, cultural practices such as intercropping and crop rotations, biological controls, physical techniques etc. to discourage the development of pest populations and to control them. Pesticides are permitted only as a weapon of last resort.
Zero or minimum tillage	'Zero/minimum tillage' was defined as the planting techniques in which the fields are not ploughed prior to planting. Farmers leave crop residues on their fields after harvest, instead of ploughing them in or burning them off.

List of Acronyms Used in the Report

Acronym	Name in Full
ADMARC	Agricultural Marketing and Marketing Corporation
ADD	Agricultural Development Division
AFRINT	African Intensification
CSR	Centre for Social Research
DR	Dependency Ratio
EPA	Extension Planning Area
FAO	Food and Agriculture Organisation
FEWS	Famine Early Warning Systems
FHH	Female Headed Household
HP	High Potential
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
LP	Low Potential
LU	Livestock Units
MHH	Male Headed Household
MP	Medium Potential
NGO	Non-Governmental Organisation
R/A	Research Assistant
RDP	Rural Development Programme
RDO	Rural Development Officer
SPSS	Statistical Package for Social Sciences

1.0 BACKGROUND

In 2002, Centre for Social Research of the University of Malawi participated in a multi-country study aimed at assessing prospects for African countries to achieve food self-sufficiency through learning from the Asia experience of agricultural intensification. A follow up study was conducted in October-December 2007 targeting the same communities and households. This is a study named "The African Food Crisis: Relevance of Asian Models' which has been coordinated by the Department of sociology at the University of Lund in Sweden. The project sprang from the concern for African food insecurity which has grown during the last decade, receiving increasing attendance with the current crisis in southern Africa and countries like Malawi, Zambia and Zimbabwe.

Currently (2006-2008), over 50% of the Malawian population is at the blink of mass starvation. This situation is getting worse by the end of each day as more and more people continue to climb down the ladder into the category of food insecure households. The advent of HIV/AIDS presents yet another big blow on the country's productive sector as it affects not only the skills and labour of the infected persons, but the pandemic is also affecting the skills and time of the caretakers and has greatly affected the demographic characteristics of the Malawian population i.e. by increasing orphan and elderly-led households. All these changes continue to pose great pressure on the country's food production potential forcing many households into desperation for food.

Recurrent crises in Malawi and in most parts of Africa breed the pessimism which is widespread about the possibilities for the continent to feed its growing population. Until recently, optimism about Asian development on the other hand seemed boundless, and Asia is considered the emerging centre of the world economy1. Food security has substantially improved in Asia since the early 70s, despite a heavy population pressure. Even countries that used to be regarded as chronically underfed, like India and Bangladesh, today are able on the whole to basically feed their populations. Prevalent problems of food insecurity in Asia do not primarily depend on production deficits (except in the case of North Korea) but on inequitable and inefficient systems of distribution.

Not long ago, the roles were reversed. Asia was regarded as the hopeless case, where in the race between population and food resources, the Malthusian scenario was enacted, and population seemed to be outgrowing resources. Part of this project was about Asian agricultural development models, and aimed at recapturing the stories of how Asia moved from food scarcity to national self-sufficiency. By a series of historically oriented case studies, the project sought to construct multi-dimensional and multi-causal models of Asian agricultural development. In the Malawian leg of the study, two components have been implemented in parallel, one looking at the geo-political and policy frameworks for the Malawian government in the pre- and post-independence periods as well as holding discussion with key policy makers on the current thinking of the government. In the other component (the micro-study), whose findings are presented in this report, a total of 400 households from four Rural Development Divisions (RDPs) were visited in 2002 and followed up again in 2007 and (re)interviewed on their agricultural practices with some special emphasis on their attempts to agricultural intensification and the resultant outputs in yield terms. Our thinking in this study is that by looking at the productivity of households practicing some kind of intensification, we may properly advance the argument that land shortage may not be a major constraint driving the Malawian population into hunger and starvation, but rather a combination of ill-timed state policies, national priorities and interventions and natural disasters.

[1] Adapted from the October 2002 AFRINT progress report

1.1 Research questions

The aim of the micro study was to capture the effects on productivity by changes in the constellation and outlook of the triad: 'state, markets, farmers' which stand out as central features in the Asian models. The following were the research questions which guided this study:

- To what extent can differences and trends in yields, technology adoption and crop marketing at household and village levels be explained by (changes in) the following household and village specific factors? Are production trends mainly driven by population growth or market demand and/or are state/donor initiated? Which are/have been the main factors facilitating and constraining intensification?

- Physical endowments & natural resources, market access (agricultural dynamism), agro-ecological characteristics (rainfall pattern, soil qualities etc.), irrigation infrastructure, distance to markets/towns, presence of all-weather roads and of public transport, land availability;
- State initiatives: presence of input or transport subsidies, state administered credit; marketing price structure (regulated or liberalised); public extension and research system; infrastructure investment;
- Markets: presence of private traders, market outlets and input markets; private/NGO extension provider; local processing industries and non-farm employment opportunities, access to consumer goods, market linkages and arrangements; presence of contract farming and outgrower schemes; and,
- Farmers: presence of farmer organisations; land tenure and water management systems; credit; demand driven extension and research systems.

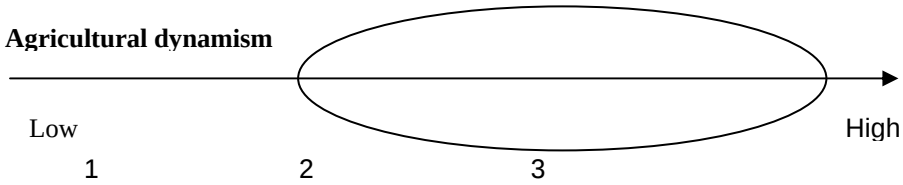
2.0 STUDY METHODOLOGY

As stated above, the present study was a follow-up to the 2002 baseline. As such, all methods mirrored those that were used in 2002. Being a multi-nation study, the methodology for selecting study areas and households was uniform across the participating countries. In this chapter, a description of how the study areas were sampled is presented as well as how the study was actually implemented.

2.1 Selection of the study sites

Sites for inclusion into the study had to demonstrate potential for improving their productivity if the necessary policies and weather conditions were favourable by looking at a number of intervening variables. What was also important in the sampling phase was to ensure that sufficient variation in terms of agricultural dynamism should be captured in each country. It was therefore agreed at the start of the project in 2002 that at least two agricultural regions with different agricultural experiences should be included in the study. The major food crops for consideration were maize, cassava, rice and sorghum/millet depending on what each of the participating countries considers as its main staple. In the case of Malawi, maize was taken as the main staple as evidence suggests that maize is consumed by over 85% of the population.

As discussed above, the interest of the micro-study was to capture this agricultural dynamism in the regions with average potential, thus excluding those regions in each country that are deemed marginal or of low agricultural potential and those regions that are considered as high potential regions. The schema presented below describes these scenarios diagrammatically. The regions for inclusion in the micro study were therefore expected to be those falling in the area labeled 1-3 in the diagram as those with low and high potential would be excluded following this rule. In the schema presented below, the tail on the low potential regions is longer than the tail on the high potential regions and all this was taken into consideration during the sampling phase for the Malawi micro study.



There are 8 Agricultural Development Divisions (ADDs) nationwide which are split into 31 RDPs and hundreds of EPAs, all of which are demarcated based on their agricultural and climatic conditions. Two ADDs (Karonga and Mzuzu are in the north), three in the centre (Kasungu, Salima and Lilongwe ADDs) whereas the southern region has three ADDs namely Machinga, Blantyre and Lower Shire Valley ADDs. We made a deliberate decision to define our regions at the RDP level so that we could properly categorize them into the three classes as presented in the schema above namely: RDPs with low potential, RDPs with average potential (subdivided further into sub-classes 1, 2 and 3) and RDPs with high agricultural potential.

In order to do the site selection for the micro study in 2002, maize production data was obtained from the country's Famine Early Warning System (FEWS) of the Ministry of Agriculture for the 5-year period beginning with the 1996/97 farming season. Average annual yields were thus derived for the five-year period in order to sort the RDPs and EPAs based on the average yields in the reference period. Ten RDPs which had registered low average annual yields and five RDPs which registered highest average annual yields in the reference period were screened out leaving us with sixteen RDPs as the sampling frame. At the next

stage, a decision was made to split the 16 RDPs into four categories (each category having 4 RDPs). This was done because we decided to conduct the study in four agricultural regions in order capture wider variation across the country. Tables of random digits were then used to select the four RDPs, one from each of the four strata. When this was done, Ntchisi RDP, Thiwi/Lifidzi RDP, Bwanje Valley RDP and Shire Highlands RDP were sampled for inclusion into the study. In terms of the three dynamism levels presented in the sampling schema above, Shire Highlands RDP belongs to level 1 (lower average potential), whereas Ntchisi RDP belongs to level 3 (higher average potential). The other two RDPs have been considered to be in second level (average potential).

When the sampled RDPs were known, lists of extension planning areas (EPAs) were obtained from the FEWS database together with their average maize yield for the same reference period of 1996/97-2000/01. EPAs for each RDP were listed in ascending order. A decision was made to select two EPAs from each RDP, making a total of eight EPAs. In the final sample of sites therefore, the following EPAs were sampled: Malomo and Kalira EPAs from Ntchisi RDP, Kabwazi and Linthipe EPAs from Thiwi/Lifidzi RDP, Golomoti and Mtakataka EPAs from Bwanje Valley RDP and Mombezi and Ntonda EPAs from Shire Highlands RDP.

Each EPA is split into sections which are managed by a Field Assistant. Lists of sections at each of the sampled EPAs were obtained and one section, which was recorded as a high potential section was selected for the study. At sectional level, 1-2 villages were selected at random on condition that the total number of households in each case should not exceed 250, a condition which was set and agreed in the study methodology development workshop. Selection of households for the interviews were done at random where the Research Assistants selected the households using a sampling interval which was determined at village level depending on the total number of farm families (households), thus allowing for variability and representativeness of the sample.

In round II, we aimed to interview the same households as in round I but about a third of the households could not be traced. Replacements were therefore made after compiling a simple listing of households in each village and selecting the required additional households at random.

2.2 Study tools

The principal study tool for the micro study was a structured questionnaire which was administered to the household farm manager who was defined as the one who is responsible for the day to day decision-making on the operations of the family farm. In our experience in 2002, the farm manager was almost the same as head of household. In their absence, the interviews were held with their spouses. In the 2002 study, the questionnaire asked the respondents to recall what the situation was like at the time when his/her household was formed (which in most cases, coincided with the year of marriage) regarding their level of agricultural intensification, access to market opportunities and their marketing practices, level of production and other indicators of intensification. In round 2, the recall questions mainly referred to the last season and one season before. Households that were newly recruited into the sample were asked recall questions for 2002 and for the time their households were just formed. In total, 398 interviews were held in the four RDPs in round II of data collection. Other data was also collected at village level through interviewing the FA and/or together with the village headman.

2.3 Field preparations

Training of Research Assistants took place in October 2007 for 1.5 weeks including conducting of a pilot study which was done in a purposively selected enumeration area, 30km from the centre of Zomba district, where the Centre for Social Research is located. This site was selected on logistical considerations but also on consideration that it grows both maize

and rice since we wanted the RAs to experience conducting interviews in an EPA which grows both maize and rice as they were likely to encounter such a situation in the Golomoti and Mtakataka EPAs. The same area was also used during the 2002 study. After the questions were fine tuned, fieldwork began in the third week of October 2008 in Chiradzulu District and went on until first week of December 2007.

The field team comprised five R/As two of whom had the Malawi Schools Certificate of Education while three were university degree holders with two of them having a BSc in Agriculture while the supervisor had a Bachelor of Social Science degree.

Data entry, which was done in SPSS, commenced in the second week of data collection and went on for one more week after data collection was completed. This report is therefore a product of this intensive exercise.

2.4 About this report

This report presents findings from Round II of data collection (follow-up study). However, comparisons are made with findings from Round I and the years for which most reference is made are 2000-2002 and 2005-2007. Year 2000 refers to the 1999/00 farming season, whereas 2001 is 2000/01 season and so forth.

3.0 CHARACTERISTICS OF THE SAMPLE HOUSEHOLDS

3.1 Sample attrition

Table 1 below shows the proportion of households that were visited both in round I and round II of data collection disaggregated by the EPA (village) where they belong. Of the 398 households that were visited in round II, 77% were also visited in round I whereas 2% were descendants of round I households (manly made of a child or children from a previous household) and 21% were new households into the AFRINT sample but not new in the EPAs or villages. Of the 306 households from Afrint I, 90% (n=274) had same heads as in Afrint I, 96% of the male headed households (MHH) and 73% of the female headed households (FHH).

Eighty four (84) households from Afrint I could not be re-interviewed because they either had ceased as households (18%, n=15) or could not be traced in the villages (82%, n=69) even using local leaders and members of the general community. There was generally equal distribution of the missing households although the low potential (LP) EPAs/villages had proportionately more missing households (25%) compared to the other EPAs/villages. Details are presented in Table 1 below. The large loss in the LP EPA/village could be due to proximity to Blantyre city as some households may have migrated into town.

Table 1: Proportion of households interviewed both in Afrint I & II and new additions

	EPA/Village Potential			
	High (n=100)	Medium (n=199)	Low (n=99)	Total (N=398)
Afrint I household	77.0	79.9	70.7	76.9
Descendant household	3.0	0.5	4.0	2.0
Attrition	20.0	19.6	25.3	21.1

3.2 Household headship and farm management

At the start of the study, we hypothesized that heads of households are not necessarily managers of farm activities. True to our speculation, the data showed that overall, 80% of the household heads were also farm managers, 88% in the LP EPAs/villages, 84% in the MP EPAs/villages and 62% in the LP EPAs/villages. As expected, the majority of female heads of households were also farm managers (96%) compared to 75% of male heads who were also farm managers. The low farm management in the LP EPAs/villages is likely due to proximity to Blantyre town where some of the males/women would be working while still residing in rural areas. The analysis in this document however uses sex of head of household rather than farm manager because of the tradition of reporting findings from surveys in the country (for reasons of comparability).

3.3 Age and sex characteristics of household heads and farm managers

The average ages for the farm managers and heads of households are presented in Table 2 below disaggregated by sex and EA/village potential. In the high potential (HP) EPAs/villages, the average age among *male* household heads was 42 years (median 39) whereas among *male* farm mangers the average age was also 42 years (median 39), implying that they may be the same individuals. In the low potential EPAs/villages, the average age among male heads of households was 42 years but among male farm mangers the average age was 43 years. The information presented in Table 2 below just illustrates that although heads and farm managers would be different people, they were essentially belonging to the same age groups and in most cases, could be spouses.

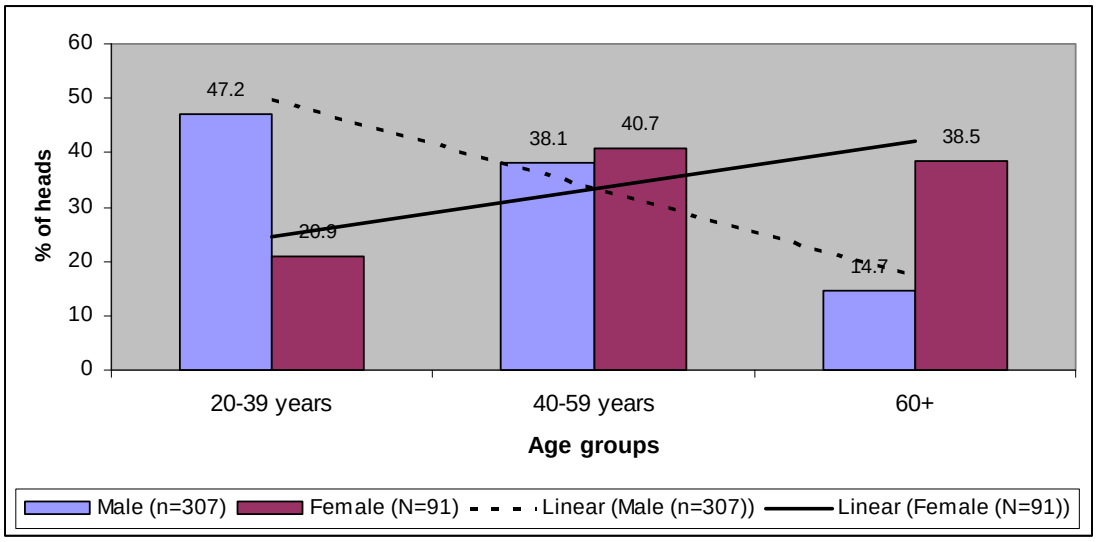
Table 2: Age and sex distribution of household heads and farm managers

		Heads		Managers	
		Mean	Median	Mean	Median
Male	High	42.3	39	42.4	39
	Medium	44.1	44	43.6	41
	Low	42.2	40	43.4	45
	Total	43.2	40	43.1	40
Female	High	58.9	60	49.4	48
	Medium	53.4	55	46.4	46
	Low	51.5	57	42.8	39
	Total	53.7	56	45.4	43
Total	High	44.8	41	44.0	40
	Medium	46.3	45	44.7	45
	Low	45.1	45	43.0	40
	Total	45.6	44	44.1	41

3.4 Sex and age distribution of household heads

Figure 1 below shows the age and sex distribution of the heads of households. Male headed households were somehow youthful and dominated the 20-39 year age group of heads and levelled up with FHH in the 40-59 year age category before falling down further to around 15% while FHH rose to 39%. Female headed households on the other hand were found to be 'older' and headed more by elderly people aged 60 years or more (39%).

Figure 1: Sex and age distribution of household heads



3.5 Educational levels of household heads

In Malawi, a person is considered literate after successfully completing standard 4 of primary school because one is expected to read and write at least in the Chichewa language. The educational levels of the heads of households are presented in Table 3 below. Close to half of the heads were illiterate (i.e. had not attended any school or completed four years of primary school), 67% of the female heads and 43% of the male heads. These findings just mirror the national situation which shows an adult literacy level of 76% % for the males and 52% for females (NSO 2005).

Table 3: Educational levels of household heads

	Sex of head		
	Male (n=307)	female (n=) 91)	Total (N=398)
<=Class 4	43.0	67.0	48.3
Class 4-8	48.5	29.7	44.2
Secondary or higher	8.5	3.3	7.3

3.6 Household sizes and dependency ratios

3.6.1 Household sizes

The average size of a household size among the households in the sample was 5.0 (median 5) members, 5.4 in HP EPA/villages, 5.1 in MP EPA/villages and 4.8 in LP EPA/villages (non-significant differences, $p<0.05$). The household sizes were significantly higher ($p<0.05$) in MHH (5.4 members) compared to FHH (4.2 members) as Table 4 below illustrates. At national level, the household size is estimated at 4.5, 4.7 for the MHH and 3.7 for the FHH.

Table 4: Average and median household sizes

EPA/village potential and sex of head	Mean	Median
High (n=100)	5.4	5
Medium (n=199)	5.1	5
Low (n=99)	4.8	5
MHH (n=307)	5.4	5
FHH (n=91)	4.2	4
Total (N=398)	5.1	5

3.6.2 Dependency ratio

Dependency ratio (DR) is a measure that is used to show how many young people (under 16) and older people (over 64) depend on people of working age (16 to 64) according to international definition of working group. Generally, the more the ratio the more pressure on the working age group so as to fend for all the household members that do not work. Using this international definition, the DR for the households in the survey according to EPAs/villages or sex of heads of households was found as shown in Table 5 below. The findings imply that for every 1 member of working age group, there are 1.25 members that depend on him/her and the DR is higher in the HP EPAs/villages (134 or 1.34 members for every 1 member of working group) followed by the MP (123). The DR was found significantly ($p<0.05$) higher in FHH (158) compared to MHH (118).

Table 5: Dependency ratios

	Age groups				Dependency Ratio
EPA/village potential	15-60	<15	>60	Total	
High	232	287	23	542	**134**
Medium	451	512	44	1007	**123**
Low	219	231	26	476	**117**
Total	902	1030	93	2025	**125**
Sex of head					
Male	754	831	58	1643	**118**
Female	148	199	35	382	**158**
Total	902	1030	93	2025	**125**

3.6.3 Proportion of household members who work on the farm

Contrary to the official definition of DR, the average proportion of workers in the households is 58% (median 50%) and no significant differences were observed between male or female headed households or across the three categories of villages/EPAs. Details are presented in Table 6 below. This implies that children younger than 16 and elderly people (>60) are also actively involved in farming.

Table 6: Proportion of household members who provide labour on the farm

	Average proportion	Median proportion
EA/village potential		
High (n=100)	59.7	50
Medium (n=199)	55.9	50
Low (n=99)	59.4	60
Sex of household head		
Male (n=307)	57.2	50
Female (n=n=91)	59.5	50
Total (N=398)	57.7	50

3.7 Division of labour for selected farming activities

Respondents to the survey were asked several questions regarding provision of labour for some farming activities including land preparation, planting, weeding, harvesting and transporting of farm produce. The picture coming out from this survey is rather mixed up but it does appear that for a good number of activities there is equal participation of both males and females especially in the HP and MP EPAs/villages. Examples include planting, fertilising and harvesting. In the LP EPAs/villages, the findings suggest more women than men are involved in planting, watching crops and land preparation (see Table 7 below). This is likely to be due to their proximity to Blantyre town where men could be involved in other activities during the farming season while their females are in the fields. There is more equal participation of males and females in the HP and MP EPAs/villages simply because there no other opportunities compared to the LP that could attract males other than farming.

Table 7: Division of labour between males and females for selected farming activities disaggregated by EPA/village potential

		EPA/Village potential			
		High (n=100)	Medium (n=199)	Low (n=99)	Total (N=398)
Land preparation	Mainly men	63.0	52.3	30.3	49.5
	Mainly women	13.0	26.1	43.4	27.1
	Equal participation	24.0	21.6	26.3	23.4
Planting	Mainly men	10.0	12.1	10.1	11.1
	Mainly women	27.0	36.7	57.6	39.4
	Equal participation	63.0	51.3	32.3	49.5
Weeding	Mainly men	39.0	41.7	21.2	35.9
	Mainly women	17.0	28.1	33.3	26.6
	Equal participation	44.0	30.2	45.5	37.4
Fertilising	Mainly men	6.0	7.0	7.1	6.8
	Mainly women	5.0	17.6	38.4	19.6
	Equal participation	89.0	75.4	54.5	73.6
Watching crops	Mainly men	46.0	46.2	14.1	38.2
	Mainly women	19.0	28.6	61.6	34.4
	Equal participation	35.0	25.1	24.2	27.4
Harvesting	Mainly men	15.0	15.1	11.1	14.1
	Mainly women	25.0	23.6	40.4	28.1
	Equal participation	60.0	61.3	48.5	57.8
Transporting crops	Mainly men	40.0	41.7	22.2	36.4
	Mainly women	19.0	23.1	34.3	24.9
	Equal participation	41.0	35.2	43.4	38.7
Feeding livestock	Mainly men	45.0	30.7	22.2	32.2
	Mainly women	14.0	24.1	40.4	25.6
	Equal participation	41.0	45.2	37.4	42.2

During analysis of data, a decision was made not to analyse and present the data on gender lines because they were skewed towards each gender on the basis of who is the head of the household. Such a detailed analysis would require a lengthy period of data collection which could include observations which was not possible in this survey. MHH reported males doing more of the activities while FHH reported females doing most of the activities.

3.8 Farming activities for which households hire or exchange labour

Generally, the majority of households involved in the survey do not hire or exchange labour for farming activities. With regard to hiring labour from outside the household, 73% of the households do not at all (Table 8). There is more hiring of labour for land preparation (21%), weeding (20%), harvesting (16%) and transporting crop produce (13%). Generally, land preparation takes place at a time when people still have funds from sales of produce in previous season and are able to hire extra labour. Weeding is a very delicate time in the farming season as any delays would render the whole crop growth-less as competition for nutrients and sunlight with between the crop and weeds increases. Harvesting is another period where more labour is needed so as to finish off early enough to avoid losing some of the produce to theft and wild fire or livestock which are left to feed on free range at this time of the year.

Table 8: Farming activities for which households hire labour

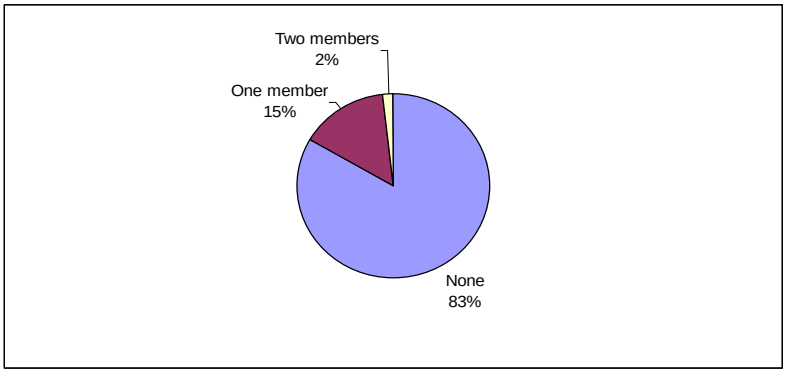
Tasks	No	Yes	No hiring
Land preparation	5.8	21.4	72.9
Planting	21.1	6.0	72.9
Weeding	7.0	20.1	72.9
Fertilising	22.6	4.5	72.9
Watching crops	26.9	0.3	72.9
Harvesting	11.6	15.6	72.9
Transporting crops	13.8	13.3	72.9
Feeding livestock	25.6	1.5	72.9

With regard to exchanging labour, 86% of the households said they don't participate in labour exchanges at all while 14% said they do and these mainly involved land preparation, weeding, harvesting and transportation of farm produce.

3.9 Households with sick members

Labour resources at home may be constrained because you have members who are sick (chronically or otherwise) because their time and skills are not available and as other household members forego work to care for them. In the survey, respondents were asked to state if they had other members of their household who were chronically sick (>=3 months) and if they had, how many. In 83% of the households, there was not chronic illness where as one household member was reported sick in 15% of the households and two members in 2% of the households. This is shown in Figure 2 below.

*Figure 2**: Proportion of households with sick children***



There were 67 households in total which had a chronically sick member and in 28 of these (42%), the illness involved someone in the age group 16-60 whereas in 15 households (22%) it involved one member aged 61 or above while in 18 (27%) it involved one member aged less than 16 years. In six households, the illness involved 2 members (1 involving members aged 16-60; 2 involving members aged less than 16 and three with members aged over 60).

3.10 Main sources of income

3.10.1 Main sources of income disaggregated by area potential

Farm-related activities account for over three quarters of the households as their main sources of income. Sale of non-staple food crops top the list at 29% but was less than half the level in the LP EPAs/villages at 14% compared to the HP (32%) and MP (35%) EPAs/villages (see Table 9 below). Non-farm salaried job accounted for 39% of the households in LP EPA/villages and this is because of proximity to Blantyre, the main

commercial city in Malawi. Sale of non-food cash crops was found high among households in HP area (30%) than MP (4%) and LP (1%) and basically this relates to tobacco which is the main cash crop grown in the Ntchisi RDP. In the MP EPAs/villages, there is high selling of non-staple food crops (36%) because they grow a lot of rice which is not considered as their staple.

Table 9: Main sources of income disaggregated by area potential

	Area potential			
	High (n=100)	Medium (n=199)	Low (n=99)	Total (N=398)
Sale of non-staple food crops	32.0	35.2	14.1	29.1
Sale of food staples	4.0	27.1	11.1	17.3
Non-farm salaried job	8.0	5.0	39.4	14.3
Micro-business	9.0	14.1	13.1	12.6
Sale of non-food cash crops	30.0	4.0	1.0	9.8
Work on others' farms/agricultural labour	6.0	6.5	8.1	6.8
Sale of animals/animal produce	8.0	5.5	6.1	6.3
Remittances	2.0	2.0	7.1	3.3
Rent interest	0.0	0.5	0.0	0.3
Leasing out machinery or animals	1.0	0.0	0.0	0.3

3.10.2 Main sources of income disaggregated by sex of head of household

Table 10 below shows the main sources of income for the households in the sample disaggregated by sex of head of household. Comparatively, there is more sale of food staples in MHH (18%) than in FHH (1%) and on the contrary, there is more selling of livestock or livestock products and more remittances in FHH (13% and 11%) than in MHH (5% and 1%). Sale of non-food cash crops was found higher in MHH at 11% compared to FHH at 6%.

Table 10: Main sources of income disaggregated by sex of head of household

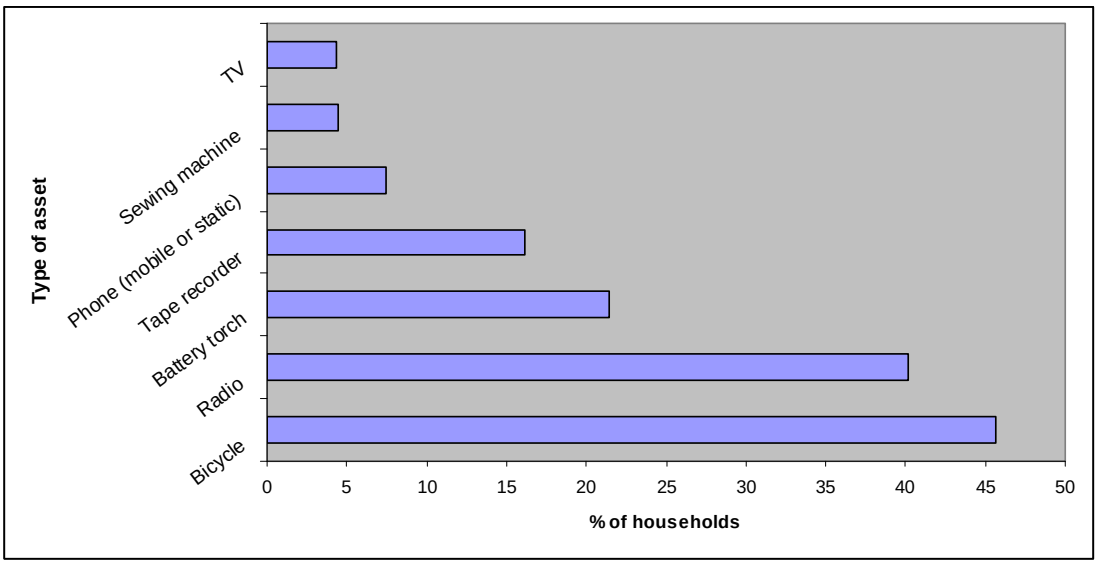
	Sex of household head		
	Male	female	Male
Sale of non-staple food crops	29.0	29.7	29.1
Sale of food staples	18.2	1.1	14.3
Non-farm salaried job	17.9	15.4	17.3
Micro-business	12.1	14.3	12.6
Sale of non-food cash crops	11.1	5.5	9.8
Work on others' farms/agricultural labour	5.2	9.9	6.3
Sale of animals/animal produce	4.9	13.2	6.8
Remittances	1.0	11.0	3.3
Rent interest	0.3	0.0	0.3
Leasing out machinery or animals	0.3	0.0	0.3

3.11 Asset ownership

Respondents were to state if they owned a number of assets. Similar to livestock, assets are used as proxy indicators of household wealth or welfare status. Figure 3 below shows the asset ownership status for the households. Ownership of bicycles and radio were the commonest (46%) and 40%, respectively) whereas TV ownership was found at 5%. Other assets or social services that were asked but excluded from the graphic presentation are access to wired electricity, generator, water pipe to house and kerosene or other modern stove. These were removed because either no household owned them or 1-2 households

reported owning them. Generally, the findings reflect the true rural life in Malawi as has been reported in various national studies.

Figure 3: Asset ownership status of the households

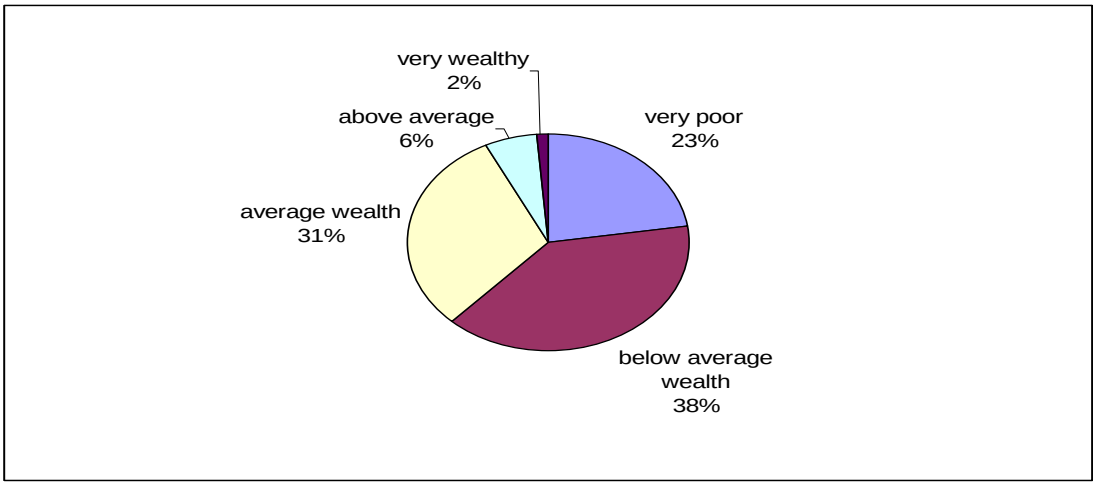


Households that reported not owning any telephone (mobile or landline) were asked whether they still had access to any of these. The results were that 67% (n=368) had access to some form of telephone when they need to use it while the rest said they had no access at all (33%). In terms of means of transport, 43% use bicycles as their reliable means of transport while the rest walk on foot.

3.12 Assessment of household welfare status (by the research team)

At the end of each interview session, the Research Assistants (R/As) were asked to rank each household into pre-defined welfare categories by using a combination of several features including asset and livestock ownership, general outlook of the housing materials and surroundings, farming experiences and income sources. This was ranking comparing with other households in each EA/village. The results of this subjective assessment are presented in Figure 4 below. Generally, the R/As considered as poor (38%) to very poor (23%) or average (31%) households.

Figure 4: Assessment of household welfare status by the research team



3.13 Methods of Drying Food Crops and Food Storage

3.13.1 Drying food crops

Drying is a method that is often used to preserve food crops in most parts of Malawi and sub-Saharan Africa. During the survey, respondents were asked to state the type of facility which they normally use when drying their produce. Half of the households use bags/mats or tarpaulins to dry their produce, more so in LP EPAs/villages (92%) and the MP EPAs/villages (48%). In the HP EPAs/villages, the majority either leave their crops standing in the field until they dry off or they cut and pile them waiting for drying and eventual harvesting. There were generally no differences observed between MHH and FHH on the drying materials or procedures (Table 11).

Table 11: Places where households dry food crops

	EPA/village potential			Sex of head		
	High (n=100)	Medium (n=199)	Low (n=99)	MHH (N=307)	FHH (n=91)	Total (N=398)
On the ground	27.0	17.1	6.1	16.9	16.5	16.8
Tarmac road	1.0	2.5	0.0	1.3	2.2	1.5
Bags, tarpaulins, mats	12.0	47.7	91.9	48.5	53.8	49.7
Concrete drying floor	1.0	0.5	0.0	0.3	1.1	0.5
Field (left standing or cut and pile)	59.0	32.2	2.0	32.9	32.2	31.4

3.13.2 Means of storing food crops

With regard to food storage, the majority of HH in the MP (80%) and LP (94%) EAs/villages use bags which they keep inside their houses whereas in the HP, they use mainly granaries (58%). There were generally no differences in the storage methods between MHH and FHH as Table 12 below illustrates.

Table 12: Means of storing food crops

	EPA/village potential			Sex of head		
	High (n=100)	Medium (n=199)	Low (n=99)	MHH (N=307)	FHH (n=91)	Total (N=398)
Bags inside house	40.0	79.9	93.9	71.7	79.1	73.4
Granary	58.0	19.1	4.0	26.7	19.8	25.1
Bags in a proper store	0.0	1.0	2.0	1.3	0.0	1.0
Other	2.0	0.0	0.0	0.3	1.1	0.5

Households generally put their food (or food produce) inside their homes at some (or for some, throughout). Respondents were then asked to state exactly where they put the bags whether straight on the floor, on pallets, under the ceilings or on other objects. Pallets are generally used to keep bags afloat so as to allow air flow as well to keep the produce safe from water as in Malawi most households use the same households for other activities including storing water (Table 13). Generally, no major differences were observed between MHH and FHH with regard to their food storage practices although proportionately more FHH tend to put their produce straight on the floor (28%) than MHH (17%).

Table 13: Procedures for storing bags inside houses

	EPA/village potential			Sex of head		
	High (n=100)	Medium (n=199)	Low (n=99)	MHH (N=307)	FHH (n=91)	Total (N=398)
Straight on the floor	11.2	19.6	26.3	16.6	28.1	19.2
On pallets	85.7	71.6	68.7	76.8	66.3	74.4
Other	3.1	8.8	5.1	6.6	5.6	6.4

With regard to treating or protecting the food produce with insecticides or other chemicals from insects or rodents, 65% of the households indicated that they do apply some chemicals and mainly for maize. However, use of such chemicals was found lower in the HP EPAs/villages (42%) compared to the MP (66%) and LP (84%) EPAs/villages and the practice was also higher among MHH (68%) than FHH (52%).

3.14 Access to institutional support in the last farming season

3.14.1 Extension services

Extension services were not available for 58% of the households in the survey in the last farming season and generally no differences across the EPA/villages or between male and female headed households. This refers to extension services provided by both the government or NGOs or the private sector. Where the services were received, rarely were they paid for and this generally reflects the public-based extension services that Malawi has as opposed to private-led extension services or services that are demand-driven. Details of access levels are presented in Table 14 below.

Table 14: Proportion of households that had acces to extension services in the last farming season (2007) disaggregated by EPA/village potential and sex of heads of households

		EPA/village potential			Sex of household head		
		High (n=100)	Medium (n=199)	Low (n=99)	Male (n=307)	Female (n=91)	Total (N=398)
Government	never	62.0	57.3	54.5	57.0	60.4	57.8
	rarely	26.0	30.2	36.4	30.9	29.7	30.7
	regularly	12.0	12.6	9.1	12.1	9.9	11.6
NGO							
	never	92.0	84.9	92.9	87.6	92.3	88.7
	rarely	6.0	14.1	7.1	11.1	7.7	10.3
	regularly	2.0	1.0	0.0	1.3	0.0	1.0
Paid	no	97.6	98.9	91.3	97.9	91.7	96.6
	yes	2.4	1.1	8.7	2.1	8.3	3.4

3.14.2 Farm Credit

Generally prices of farm inputs are beyond the affordability of most smallholder farmers in Malawi or even those in low wage employment. As such, opportunities for farm credit offer relief to those seeking to use the inputs, which generally involves almost all the farmers but opportunities differ. In the survey, respondents were asked if they (the respondents) or some members of their households obtained an agricultural-related credit in the last season and the response was overwhelmingly 'No', at least for three quarters of the respondents (75%). Details are shown in Table 15 below and it would appear households in HP EPAs/villages had relatively more opportunities (42%) than households in the MP (25%) or LP (7%) EPA/villages.

Table 15: Proportion of households who household members had access to some farm credit in the 2007 farming season disaggregated by EPA/village potential and sex of heads of households

	EPA/village potential			Sex of household head		
Any credit?	High	Medium	Low	Male	Female	Male
no	58.0	74.6	92.9	71.8	85.7	75.0
yes	42.0	25.4	7.1	28.2	14.3	25.0

3.15 Summary

The findings presented in this Chapter have shown that:

- Households in the survey have higher dependency ratios (DR) compared to national estimate of 1.1 in 2004/05. DR was found 1.3 among the households, 1.3 in the HP EPAs/villages, 1.2 in both the MP and LP EPAs/villages and 1.6 among FHH as opposed to 1.2 among MHH. However, the definition of DR excludes other active workers in the survey households as 58% of the household members including those aged <15 and >60 (on average) were reported to provide labour for the upkeep of the household;
- Participation of male and female household members in various farming activities seems to be equal regardless of gender in general. In LP EPAs/villages however, there was more participation by female household members than males for a number of activities and this is likely to be due to proximity to Blantyre town where men are likely to be employed. This is also evidenced by main sources of income which showed that in the LP EPAs/villages, non-farm salaried job was the main source of

income for 39% of the households as opposed to 8% in HP and 5% in LP EPAs/villages, respectively;

- There is very little hiring and exchange of labour for farming activities in all the EPAs/villages. On average, hiring of labour is practiced in 13-21% of the households mainly during peak periods such as land preparation weeding, harvesting and transporting crops
- Access to institutional support (extension and credit) was reported decimally during the 2006/07 farming season. Over half (58%) never had any access to extension services in the season, 31% had some access but sporadic and 75% of the households had no members who had access to farm-related credit/loan in the 2006/07 season. Comparatively, there was more credit access in the HP EPAs/villages (42%) followed by the MP (25%) and last was the LP at 7% of the households. Access to farm-related credit/loan was 28% in MHH as opposed to 14% among FHH in the 2006/07 season

4.0 GENERAL CROPPING PATTERNS OF THE SAMPLED HOUSEHOLDS

4.1 Range of staple food crops being grown by the households

In both 2002 as well as 2008, respondents were asked to state what crops they grew in the most recent season before the survey and crops grown in the last 1-2 seasons before the most recent. For the new households in 2008 they were also asked about crops which they grew in 2002. This was done so as to assess whether households are changing their cropping choices over the years. Table 16 below shows the results of this analysis.

Maize cultivation has been stable over the years under observation (2002, 2006 and 2007) being cultivated by almost all the households in the sample (99%). Cassava has remained predominantly being cultivated in the low potential (LP) EPAs/villages, 71% of the households in 2001, 76% in 2006 and 69% in 2007. In the high potential (HP) EPAs/villages, cassava cultivation has dropped by almost half from 8% in 2002 to 4% in 2006 and 2007.

Table 16: Trends in food crop cultivation for te periods 2002, 2006 and 2007 disaggregated by EPA/village potential

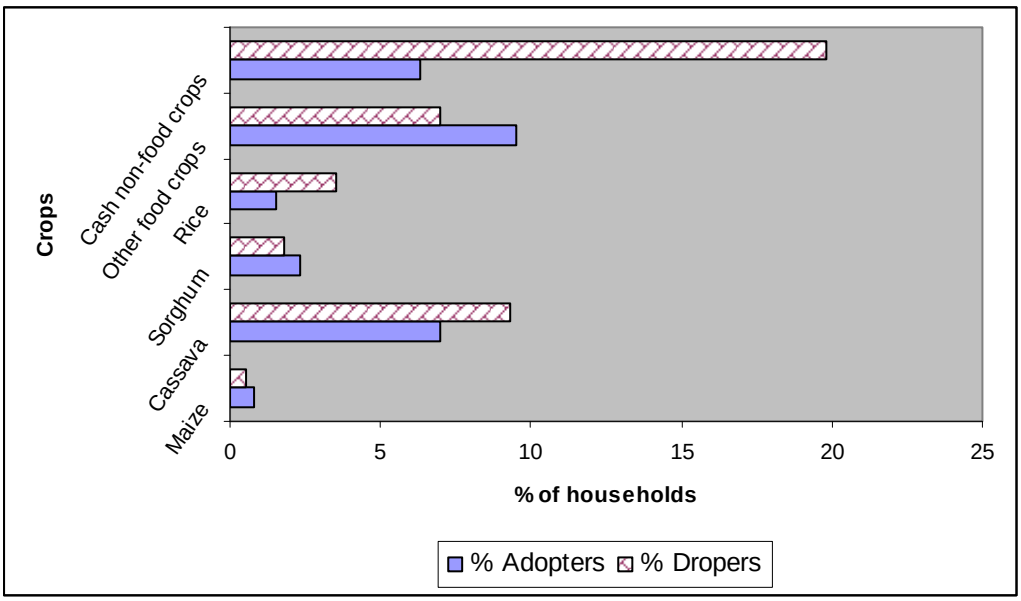
	EPA/Village potential											
	High (n=100)			Medium (n=199)			Low (n=99)			Total (N=398		
	2002	2006	2007	2002	2006	2007	2002	2006	2007	2002	2006	2007
Maize	98.0	100.0	99.0	99.0	99.5	99.0	100.0	100.0	100.0	99.0	99.7	99.2
Cassava	8.0	4.0	4.0	11.1	11.1	9.5	70.7	75.8	68.7	25.1	25.4	22.9
Sorghum	1.0	0.0	0.0	2.5	4.0	5.0	3.0	0.0	1.0	2.3	2.0	2.8
Rice	0.0	0.0	0.0	47.2	41.2	42.7	0.0	0.0	1.0	23.6	20.6	21.6
Other food crops	94.0	97.0	96.0	73.4	80.9	78.9	98.0	98.0	94.9	84.7	89.2	87.2
Cash non-food crops	54.0	42.0	39.0	27.6	14.6	11.6	11.1	4.0	4.0	30.2	18.8	16.6

Rice remains a crop only cultivated in the medium potential (MP) EPAs/villages, probably because of water availability and geographic terrain being close to the Lake and waterlogged areas but a 5-7 percentage drop was observed in the proportion of households cultivating the crop between 2002 and 2007 (Table 16 above). Big drops were observed for cash crops (non-food) from 54% in 2002 to 42% in 2006 and 39% in 2007 in the HP EPAs/villages and from 28% in 2002 to 15% in 2006 and 12% in 2007 in the MP EPAs/villages. Similar significant drops were also observed in the LP EPAs/villages.

4.2 Proportion of crop adopters and droppers

Figure 5 below shows the proportion of households that dropped cultivation of certain crops in 2007 which they grew in 2002 or picked-up cultivation of the crop in 2007 (did not grow it in 2002). A fifth of the households had dropped cultivating cash crops (non-food) in 2007 against ~8% who had picked up cultivation of the crops. Over the two reference periods, cassava cultivation was dropped by 9% of the households while gaining 8% of households that did not grow it in 2002 and rice dropped 3% and gained 2% of the households.

Figure 5: Proportion of households reporting dropping or d/starting growing some crops between 2002 and 2007



Households that dropped some crops were asked why they decided not to grow the crops again 2007 (or in the years before). For the cash crops, 14 households provided reasons as to why they stopped growing them as economic-related (64%) i.e. non-profitable; agronomic (21%) i.e. production has been going down and 14% cited labour constraints. Six households provided responses with regard to stopping cassava, 4 of whom cited economic reasons (non profitable) and the remaining two cited agronomic and labour related constraints. Ten households provided reasons for stopping rice in the ratio 6:3:1 for economic, agronomic and labour related factors, respectively.

4.3 Production and marketing of other non-staple food crops

4.3.1 By EPA/Village

Table 17 below shows the proportion of households that grew and sold non-staple food crops in 2007 disaggregated by the EPA/village potential. Generally, higher proportions of households in LP EPAs/villages grew and sold their non-staple food crops. The cropping patterns generally reflect their agricultural zones with more groundnuts being produced in the HP EPAs/villages (Central Region of Malawi) and more beans and vegetables being produced and sold in the LP EPAs/villages, which are closer to Blantyre, the main city in Malawi. Apparently, most of the beans, sweet potatoes, groundnuts and vegetables that are produced in the HP EPAs/villages (and to some extent in the MP EPAs/villages) are for domestic consumption because there are no ready markets for the crops compared to the LP EPAs/villages.

Table 17: Proportion of households reporting producing and selling non-staple food crops in 2007 disaggregated by EPA/village

	EPA/village potential							
	HP (n=100)		MP (n=199)		LP (n=99)		Total (N=398)	
	% Grew	% Sold	% Grew	% Sold	% Grew	% Sold	% Grew	% Sold
Beans	62.0	14.0	46.7	25.7	89.9	56.6	61.3	30.4
Sweet potatoes	46.0	16.0	34.7	12.1	48.5	22.2	41.0	15.6
Vegetables	31.0	23.0	27.1	19.6	55.6	33.3	35.2	23.9
Groundnuts	81.0	52.0	22.1	16.6	12.1	2.0	34.4	21.9
Bananas	23.0	15.0	15.6	7.5	40.4	24.2	23.6	13.6
Peas	5.0	1.0	12.6	4.5	61.6	35.4	22.9	11.3
Irish potatoes	11.0	3.0	26.6	22.1	6.1	2.0	17.6	12.3
Millet	3.0	1.0	17.1	5.0	10.1	4.0	11.8	3.8
Fruits	5.0	6.0	2.0	3.5	8.1	6.1	4.3	4.8

4.3.2 By sex of head of household

Table 18 below shows the proportion of households that reported growing and selling non-staple food crops in 2007 disaggregated by sex of head of household. Generally, there were no significant differences (confirmed by chi-square tests) between MHH and FHH in their growing patterns or their participation in selling of their non-staple food produce.

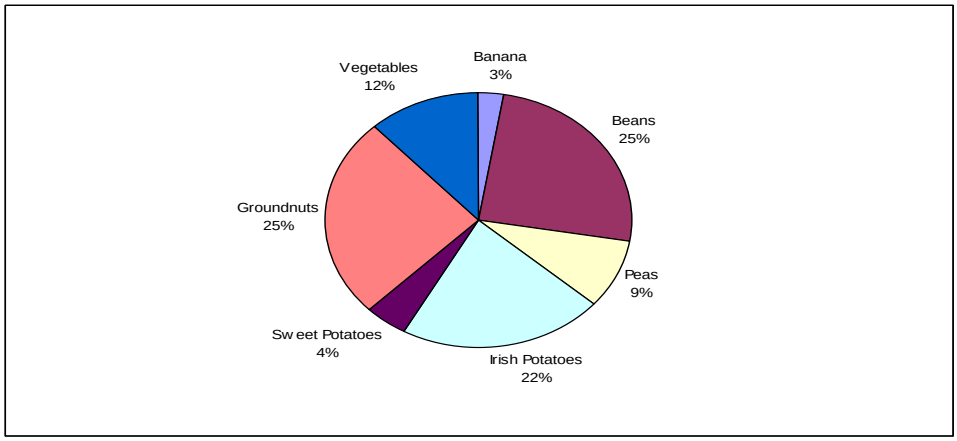
Table 18: Proportion of household reporting growing ad selling non-staple food crops in 2007 disaggregated by sex of head of household

	Sex of head of household					
	Male		Female		Total	
	% Grew	% Sold	% Grew	% Sold	% Grew	% Sold
Beans	62.9	31.9	56.0	25.3	61.3	30.4
Sweet potatoes	43.0	17.6	34.1	8.8	41.0	15.6
Groundnuts	36.8	23.1	26.4	17.6	34.4	21.9
Vegetables	36.5	24.1	30.8	23.1	35.2	23.9
Bananas	23.1	14.3	25.3	11.0	23.6	13.6
Peas	21.8	11.1	26.4	12.1	22.9	11.3
Irish potatoes	19.2	14.3	12.1	5.5	17.6	12.3
Millet	12.4	3.6	9.9	4.4	11.8	3.8
Fruits	4.6	5.2	3.3	3.3	4.3	4.8

4.4 Perceptions about profitability of non-staple food crops

Overall groundnuts, beans and Irish potatoes were considered as the most profitable of the non-staple food crops when sold as nearly three quarters of the respondents cited the three crops compared to crops such as pea, vegetables and fruits. Figure 6 presents detailed findings on this.

Figure 6: Overall perceptions on the profitability of the non-staple food crops (Ranks)



However, when the perceptions on the profitability of the crops were considered on the basis of EPA/village location, the findings (shown in Table 19 below) showed that groundnuts are considered more profitable in the HP EPAs/villages (82% of households) whereas Irish potatoes in the MP EPAs/villages (48%) and Beans in the LP EPAs/villages (52%). This only reflects the cropping pattern of the three crops with more groundnuts grown in the central region while Irish Potatoes grown more in the central region but towards the south while beans are grown more in the southern region (at least when the study communities are the only areas considered).

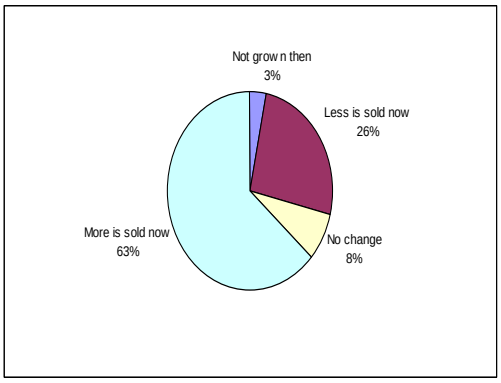
Table 19: Perceptions on the profitability (ranks) of non-staple food crops disaggregated by EPA/village

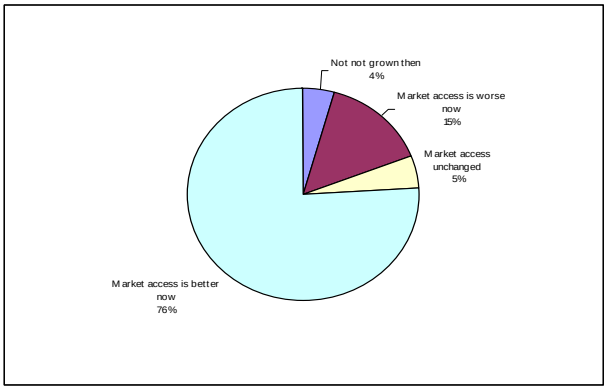
	EPA/Village			
	High (n=39)	Medium (n=81)	Low (n=65)	Total (N=185)
Banana	2.6	3.7	1.5	2.7
Beans	2.6	13.6	52.3	24.9
Peas	0.0	6.2	16.9	8.6
Irish Potatoes	0.0	48.1	1.5	21.6
Sweet Potatoes	0.0	4.9	6.2	4.3
Groundnuts	82.1	18.5	0.0	25.4
Yams	0.0	0.0	1.5	0.5
Vegetables	12.8	4.9	20.0	11.9

4.5 Perceptions on production trends and market access for non-staple food crops

With regard to changes to market access and volumes of produce being sold between 2002 and 2007 (round I and round II of data collection), the general perceptions were that market access had improved in 2007 consequently being reflected in the increased volumes of the non-staple food crops which were being sold. Details are presented in Figures 7a & b below.

Figures 7 (a&b): Perceptions with regard to market access and volumes of non-staple food crops being sold between 2002 and 2007





4.6 Production of non-food cash crops[2]

Three non-food cash crops emerged as being grown by a few of the sampled households. Tobacco was predominantly mentioned in The HP (35%) EPAs/villages but was virtually non-existent in the other EPAs/villages whereas cotton was mentioned in MP EPAs/villages (7%) but none mentioned it in the other EPAs/villages. Sugarcanes came up in 6% of the households. Table 19 presents the details.

Table 20: Proportion of household growing non-food cash crops

	EA/village potential			Sex of household head		
	High (n=100)	Medium (n=199)	Low (n=99)	MHH (n=307)	FHH (n=91)	Total (N=393)
Cotton	0	6.5	0	3.6	2.2	3.3
Sugarcane	9	4.0	5	5.9	4.4	5.5
Tobacco	35	1.0	0	10.7	4.4	9.3

Of the 85 MHH in the HP EPAs/villages, 37% reported growing tobacco while among FHH, tobacco growing was reported in 20% of the households (n=15). In the MP EPAs/villages, 7% of the 153 MHH reported growing cotton as opposed to 4% of the 46 FHH.

4.7 Ownership of Livestock

In both 2002 and 2008, respondents were asked to state the types and numbers of livestock that each household owned. Livestock ownership (as well as other assets) are usually considered as proxy indicators of household wealth or welfare. To compare different types and numbers of livestock that different households own there is need for a common 'factor' for conversion into same units and this is called livestock unit or LU. There are many ways of deriving LU but this report adopts a system by FAO which has different LU for different regions of the world.

The livestock unit is generally a standardized 'animal units' obtained by multiplying total number of animals with a conversion factor that takes into account "feed requirements" for the animal. Coincidentally, animals are also ranked by the relative values on the market although not necessarily in equal proportions (rank-wise). One cow in sub-Saharan Africa is

[2] The analysis in this section is only limited to highlighting proportions growing the crops because the paper is focussed more on food crop production rather than cash crops

assigned a LU of 0.5, 0.1 for sheep and/or goats, 0.2 for pigs, 0.5 for donkeys and 0.01 for poultry.

4.7.1 By EPA/village potential

Table 21 below shows the status of livestock ownership in the households that were sampled disaggregated according to the level of potential for the EA/villages. About a quarter of the households (27%) in 2008 had no livestock at all, 16% had up to 0.09 LU (poultry), a further 26% had between 0.1 and 0.49 LU. Generally, livestock ownership in the sampled households was very low but was lowest in the LP EPAs/villages where only 1% of the households had 2 or more LU. Comparing with 2002, there has been a general improvement in livestock ownership status across the villages/EAs.

Table 21: Livestock ownership status in 2002 and 2007 disaggregated by EPA/village potential

	Regional Potential							
	High (n=100)		Medium (n=199)		Low (n=99)		Total (N=398)	
	2002	**2007**	**2002**	**2007**	**2002**	**2007**	**2002**	**2007**
No livestock	26.6	24.0	30.6	26.1	37.8	31.3	31.3	26.9
Up to 0.09 LU	10.1	12.0	24.4	17.6	23.0	18.2	20.4	16.3
0.1-0.49 LU	29.1	29.0	20.6	23.6	31.1	27.3	25.2	25.9
0.5-0.99 LU	17.7	12.0	10.6	12.1	5.4	14.1	11.2	12.6
1-1.99 LU	6.3	15.0	5.0	9.5	2.7	8.1	4.8	10.6
2 or more LU	10.1	8.0	8.8	11.1	0.0	1.0	7.0	7.8

4.7.2 By sex of heads of households

The ownership status of livestock according to sex of head of household in 2002 and 2007 in the sampled households are shown in Table 22 below. The picture is rather mixed up but more generally, MHH seem to have improved in LU compared to the FHH. There has been a drop (through not significant) in the proportion of households without livestock from 31% in 2002 to 24% among MHH while among FHH there has been an increase from 34% to 35% in the same period. For households with LU between 0.01 and 0.09, MHH reduced from 23% to 15% while FHH increased from 13% to 20% and for households with LU between 0.1 and 0.49, MHH increased from 22% to 27% while FHH decreased from 34% to 22%.

Table 22: Livestock ownership in 2002 and 2007 disaggregated by sex of head of household

	Sex of head of household					
	Male (n=307)		Female (n=91)		Total (N=398)	
	2002	**2007**	**2002**	**2007**	**2002**	**2007**
No livestock	30.5	24.4	33.8	35.2	31.3	26.9
Up to 0.09 LU	23.2	15.3	12.5	19.8	20.4	16.3
0.1-0.49 LU	22.3	27.0	33.8	22.0	25.2	25.9
0.5-0.99 LU	11.6	12.4	10.0	13.2	11.2	12.6
1-1.99 LU	5.2	11.4	3.8	7.7	4.8	10.6
2 or more LU	7.3	9.4	6.3	2.2	7.0	7.8

4.8 Ownership of fish ponds and access to fishing opportunities

Only four (4) households or 1% had fish ponds of their own, 2 from the HP and 2 from the MP EPAs/villages. However, 27% of the households had access to fishing opportunities, 35%

of the households in HP, 33% in MP and only 7% in the LP EPAs/villages. The high proportion of households in the HP that had access to fishing is due to Bua River while in the MP is due to Lake Malawi whereas in the LP, smaller rivers run close to the villages where some fishing is done. Close to a third of the MHH (33%) had access to some fishing opportunities compared to 8% of the FHH. Generally, the fishing that is done is just for home consumption (90%) rather than for commercial purposes (10%).

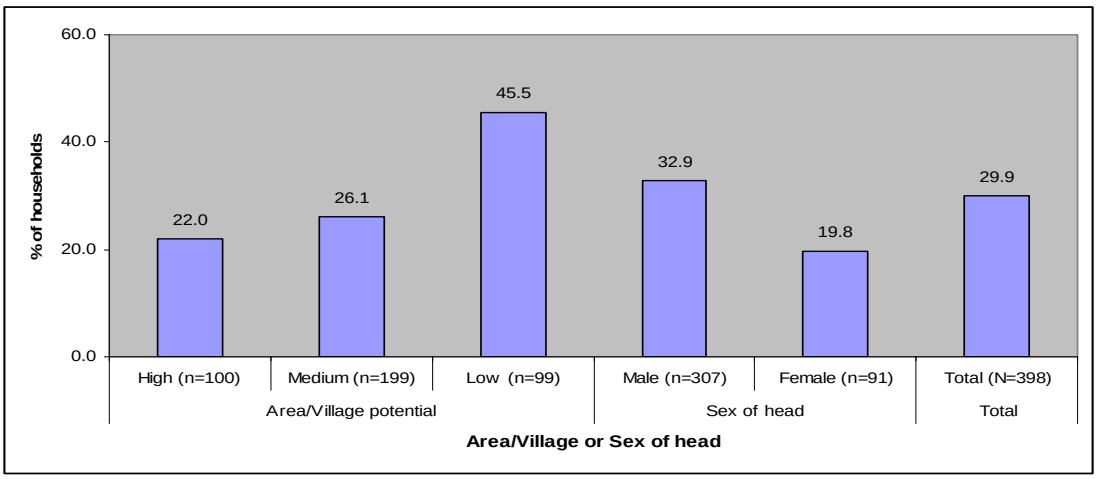
4.9 Rural-Urban and Rural-Rural Linkages

Rural-urban linkages or rural-rural linkages may be explored on the nature of production, consumption and investment network linkages between urban and rural areas or between rural areas on their own. The whole debate on how these are unfolding in Malawi was not the focus of the Afrint study. Data that was collected only wanted to assess if households in rural areas were sending food to relatives and friends residing in urban or other rural areas. However, we may infer from the data that more transactions are taking place between rural and urban areas and within rural areas by looking at data on sources of income, places where people sell their produce and people's main occupations. In the section on main sources of income, for example, 7% of the households in LP EPAs/villages depend on remittances (2% for households in HP and LP EPAs/villages) and 11% of the FHH in the sample cited remittances as their main source of income (1% of the MHH). There is also high dependency on non-farm salaried job as source of income in the LP EPAs/villages (39%) compared to the other EAs or villages[3]. This just provides an overview of other forms of rural-urban linkages that were not explored in full but are actually happening among the sampled households.

4.9.1 Proportion of households that send produce to relatives outside village

Figure 8 below shows the proportion of households that reported sending out food to friends and relatives as remittances. Generally, there was a high proportion of households in the LP EPAs/villages (46%) which reported sending our food to other people compared to households in the MP (26%) and LP (22%) EPAs/villages. Almost a third of MHH (33%) and a fifth (20%) of FHH reported sending food to relatives and friends as remittances.

Figure 8: Proportion of households that send produce to relatives outside village

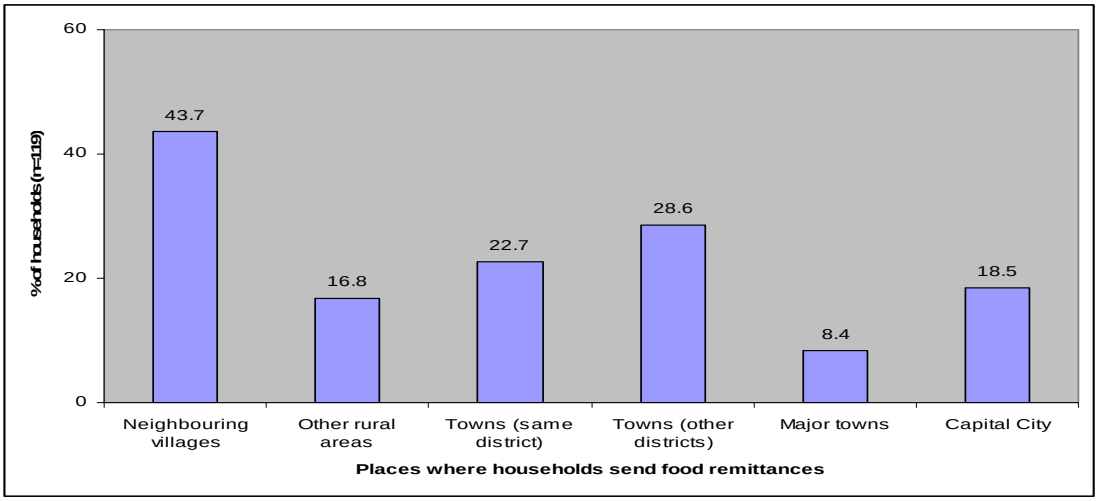


[3] LP EPAs/villages were sampled very close to Blantyre, the main commercial city in Malawi

4.9.2 Places where households send food remittances

Respondents who reported sending food to relatives and friends outside their villages as remittances were asked to state where their relatives/friends stay and the respondents were allowed to mention all places where the food is sent. The findings on this are presented in Figure 9 below. As would be observed, there are a lot of inter-village village food transfers (44%) and other rural areas (17%) followed by food transfers to relatives residing in other major towns (districts outside district of residence) at 29%. However, over two-thirds of the households (68%) send only to one place whereas 27% send to two places and 5% send to three or more places (whether urban or rural).

Figure 9: Places where households send food remittances (multiple response were allowed)



4.9.3 Amount and proportion of maize produce sent out as remittances[4]

Table 23 below shows the amount and proportion of maize sent out to relatives and friends as remittances in year before the survey in 2007 (2006/07 farming season). On average households sent out 13% (9% median) of their maize produce as remittances, 10% among households in HP EPAs/villages, 14% in MP EPAs/villages and 13% among households in LP EPAs/villages. The analysis of variance that was conducted to test differences in the amounts sent out showed non-significant differences both between MHH and FHH and/or across households from HP, MP and LP ($p>0.05$). Households in HP sent out 112kg of maize on average (100kg median) during the year compared to 113kg on average in MP and 156kg in LP and MHH sent out 133kg on average while FH sent out 95kg on average. Again, the differences were statistically not significant ($p>0.05$).

Table 23: Amounts and proportion of maize sent out as remittances

	% of overall produce		Amount remitted (kg)	
	Mean	Median	Mean	Median
High (n=41)	10.1	8.3	111.7	100.0
Medium (n=57)	14.4	9.1	112.5	75.0
Low (=56)	12.5	9.2	155.5	100.0
MHH (n=132)	12.0	8.5	133.0	100.0
FHH (n=22)	16.0	12.5	95.0	87.5
Total (N=154)	12.6	9.0	128.0	100.0

[4] Maize was used in this analysis because it was the only widely produced food crop across the EA/villages

Other than sending food staples to relatives and friends outside the villages, a third o the households (30%) also reported sending non-staple food crop (such as vegetables, pulses and livestock and livestock products) to their relatives and friends. There was no major difference observed across village potential or between MHH and FHH.
Pattern of meal consumption

Respondents were also asked to state their meal consumption patterns during the lead period and at other times of the year. Generally meal consumption patterns are similar across the three EA/village types although households in the LP seem to be consuming more meals compared to households in the HP or MP more especially with regard to breakfast ad lunch. On the other hand, MHH take more meals per day compared with FHH both in the lead period and the rest of the year. Details are presented in Table 24 below.

Table 24: Meal consumption patterns in the lean period and the rest of the year

	Lean Period			Rest of year		
	Breakfast	Lunch	Super	Breakfast	Lunch	Super
EA/village potential						
High (n=100)	19.0	63.0	94.0	61.0	100.0	100.0
Medium (n=199)	20.6	73.9	93.0	64.0	100.0	100.0
Low (n=99)	30.3	77.8	91.9	73.0	100.0	99.0
Sex of head						
MHH (n=307)	25.1	74.9	95.1	67.0	100.0	99.7
FHH (n=91)	14.3	62.6	85.7	58.0	100.0	100.0
Total (N=398)	22.6	72.1	93.0	65.0	100.0	99.7

4.10 Summary

The findings presented in this chapter have shown that:

- Maize is still the dominant crop being grown in the study areas and had not changed the proportions of households growing between 2002 and 2007 (>99%). There has been some dropping of cassava (9%), rice (3%) and non-food cash crops (~20%) between 2002 and 2007 mainly on economic reasons (resulting from dissatisfaction with produce prices vis-à-vis levels of investment – time, labour and inputs);
- Production and perceptions on the profitability of non-staple food crops varies across the three EPAs/villages with the HP registering groundnuts as the most profitable (82% of households), MP registering Irish potatoes (48%) and LP registering beans (52%). This is mainly due to agronomic reasons and market availability;
- Households generally felt access to markets for crop produce had improved in 2007 compared to 2002 albeit lower produce prices;
- Ownership of livestock was generally found decimal among the households in the sample with a quarter (27%) of the 398 households owning none at all in 2002, an improvement from 31% in 2002. Among the households with livestock, the majority own poultry and small ruminants (LU ranging from 0.01 to 0.99 had >55% of the households);
- There were more rural-urban or rural-rural linkages in the LP EPAs/villages (46%) compared to the HP (22%) and LP (26%) EPAs/villages. In 44% of the cases, the linkages involve rural-rural interactions whereas in 29% they involve towns outside district of residence. Households sell or send ~10-15% of their maize produce through the rural/urban or rural-rural linkages

5.0 KNOWLEDGE AND PRACTICES OF IMPROVED METHODS OF FARMING

This Chapter provides an overview of the knowledge levels of various improved or modern farming practices and the level to which these practices were reportedly being put to use in the communities which were studied. Research assistants provided a description of each practice to the respondents before asking them if they knew it and whether they were practicing it or not. For those practices known but were not being practiced, the respondents were also asked to state the reasons why this was the case. These practices are spilt into three categories: practices relating to land preparation and cropping patterns; practices relating to soil enhancement or improvement; and, practices relating to protection of the crops, soil and/or water. Definitions for the various terms have been provided in section _____ at the start of this report on page _____.

5.1 Practices relating to land preparation and cropping patterns

5.1.1 Knowledge and practices according to EPA potential

Table 25 below shows the levels of knowledge and adoption of various practices relating to land preparation and cropping systems disaggregated according to potential of the EPAs/villages. Generally, knowledge levels of the practices are very high with each practice which was asked scoring over 68% knowledge levels. Mixed cropping, improved planting practices, intercropping and crop rotation are the most widely known practices with an overall knowledge score of not less than 92%. There were generally no significant differences across the three EPA/village categories with regard to the levels of knowledge.

Table 25: Knowledge and practices of various farming techniques according to EPA potential

	% Knowing the practices EPA/Village potential				% using the practices (prevalence) EPA/Village potential			
	HP	MP	LP	Total	HP	MP	LP	Total
Mixed cropping	100.0	99.0	99.0	99.2	68.0	70.9	93.9	75.9
Improved planting practices	100.0	99.0	98.0	99.0	99.0	84.4	93.9	90.5
Intercropping	100.0	88.4	98.0	93.7	63.0	53.8	89.9	65.1
Crop rotation	99.0	92.0	84.8	92.0	92.0	56.3	52.5	64.3
Fallowing	95.0	84.9	75.8	85.2	37.0	19.1	14.1	22.4
Breaking the hard pan	96.0	78.9	68.7	80.7	80.0	66.3	42.4	63.8
Improved fallowing	95.0	70.9	72.7	77.4	83.0	37.2	48.5	51.5
Zero/minimum tillage	73.0	75.9	50.5	68.8	12.0	43.2	3.0	25.4

With regard to adoption of the various practices, the findings showed a 20-30 percentage drop in the proportion of households that reported using the various practices. The largest drop was observed on zero or minimum tillage which was known to 69% of the 398 respondents but only a quarter of them reported using it. Generally, Malawians are used to breaking the hard pan, making ridges and planting their crops on those ridges and this has been the emphasis of previous extension messages. This explains the high application of 'improved planting practices' (91%) and breaking the hard pan (64%) in this survey. This serves several purposes including water conservation, loosening the soils for root penetration and facilitating ease of weeding and fertiliser application. Intercropping (the planting and mixing of cereals and nitrogen fixing legumes and pulses in the same field) and mixed

cropping seem to be applied more in the low potential (LP) EPAs/villages at 90% and 94%, respectively compared to the other EPAs/villages.

5.1.2 Knowledge and practices according to sex of head of household

The levels of knowledge for the various farming practices, soil fertility improvement techniques and soil and water conservation practices according to sex of head of household are presented in Table 26_ below. As would be observed, sex of head of household is not a determining factor for the knowledge levels. The same observation applies for the actual practice as the proportions are almost the same across the various practices (p>0.05).

Table 26: Knowledge and practices of various farming techniques according to

	Knowledge			Practice		
	Sex of heads of households			Sex of heads of households		
	MHH	FHH	Total	MHH	FHH	Total
Mixed cropping	99.0	100.0	99.2	74.6	80.2	75.9
Improved planting practices	99.0	98.9	99.0	91.2	87.9	90.5
Intercropping	92.8	96.7	93.7	62.9	72.5	65.1
Crop rotation	92.8	89.0	92.0	66.4	57.1	64.3
Fallowing	84.7	86.8	85.2	21.2	26.4	22.4
Breaking the hard pan	81.4	78.0	80.7	66.4	54.9	63.8
Improved fallowing	77.5	76.9	77.4	51.8	50.5	51.5
Zero/minimum tillage	69.4	67.0	68.8	25.4	25.3	25.4

5.1.3 Reasons for not practicing some farming techniques despite knowing them

The respondents who had knowledge of some farming techniques but were not practicing them were asked to state why this was the case and each respondent was allowed to state up to *two* major reasons. As Table 27 below illustrates, between a third (~30%) to two-thirds (~67%) of the respondents doubted the relevance of the techniques to them. Slightly above a third (40%) doubted if crop rotation (or knowledge of) was relevant to them and basically this is due to landholding sizes which are very small. The same applies to fallowing (whether improved or ordinary) as people cannot practice fallowing amidst landholding constraints.

Table 27: Reasons for not practicing some farming techniques despite knowing them

				Practice abandoned	
	Labour	Costs	Not relevant	Temporal	Forever
Rotation (n=110)	40.7	19.8	39.6	9.9	15.4
Mixed cropping (n=93)	33.7	12.4	31.5	10.1	39.3
Intercropping (n=115)	22.5	14.7	32.4	6.9	46.1
Fallowing (n=87)	10.7	2.7	53.3	2.7	42.7
Improved fallowing (n=103)	11.3	14.2	67.0	10.4	14.2
Zero tillage (n=114)	7.7	4.1	47.9	3.0	67.5
Breaking the pan (n=67)	61.0	17.1	24.4	7.3	20.7
Improved planting (n=34)	24.0	52.0	48.0	8.0	8.0

5.2 Practices relating to soil fertility enhancement

5.2.1 Knowledge and practices according to EPA/village potential

The respondents were asked whether they knew several soil fertility enhancing farming practices including use of chemical fertiliser, animal manure, green or composite manure and Agroforestry. Generally, knowledge levels were very high for almost all the practices except Agroforestry which registered lower knowledge levels (56%) in the LP EPAs/villages as opposed to the HP (88%) and MP (83%) EPAs/villages (see Table 28 below). With regard to adoption or use (current), chemical fertiliser registered the highest proportion of users at 68% followed by green or composite manure at 49% and the lowest was integrated nutrient management (the mixing of organic and in-organic nutrients to improve soil nutrient capacity).

Table 28: Knowledge and practice of soil fertility enhancing techniques according to EA potential

	Knowledge				Practice			
	EPA/village potential				EPA/village potential			
	HP	MP	LP	Total	HP	MP	LP	Total
Use of chemical fertiliser	100.0	98.0	99.0	98.7	78.0	48.2	97.0	67.8
Use of animal manure	100.0	99.0	94.9	98.2	54.0	28.1	28.3	34.7
Use of green/composite manure	93.0	90.5	91.9	91.5	51.0	48.2	46.5	48.5
Integrated nutrient management	94.0	82.9	60.6	80.2	47.0	20.1	29.3	29.1
Agroforestry	88.0	82.9	55.6	77.4	39.0	38.7	11.1	31.9

5.2.2 Knowledge and practices according to sex of head of household

The levels of knowledge and use of various soil fertility enhancement farming techniques according to sex of heads of households are presented in Table 29 below. Both knowledge and adoption levels are almost similar between MHH and FHH with minor differences observed on the knowledge and adoption of integrated nutrient management (82% for MHH and 74% for FHH on knowledge levels and 32% in MHH and 20% in FHH on adoption).

Table 29: Knowledge and practice of soil fertility enhancing techniques according to EA potential

	Knowledge			Practice		
	Sex of heads of households			Sex of heads of households		
	Male	Female	Total	Male	Female	Total
Use of chemical fertiliser	98.7	98.9	98.7	69.4	62.6	67.8
Use of animal manure	98.4	97.8	98.2	37.1	26.4	34.7
Use of green/composite manure	91.9	90.1	91.5	47.6	51.6	48.5
Integrated nutrient management	82.1	73.6	80.2	31.9	19.8	29.1
Agroforestry	79.5	70.3	77.4	32.6	29.7	31.9

5.2.3 Reasons for not practicing soil fertility enhancing techniques despite knowledge

As expected, 'cost' hinders most of the households to use soil fertility enhancing techniques including use of chemical fertiliser (82%), animal manure (69%) and integrated soil nutrient management (59%). Some households have abandoned certain practices after noticing that they were not making any headway even in their productivity, 16% for green manure, 8% for Agroforestry and 7% for animal manure and integrated soil nutrient management (Table 30).

Table 30: Reasons for not practicing soil fertility enhancing techniques despite knowledge

	Labour	Costs	Not relevant	Practice abandoned Temporal	Forever
Agroforestry (n=174)	15.5	54.9	18.3	9.2	7.7
Integrated soil nutrient Mngt. (n=203)	26.5	59.4	31.2	4.7	6.5
Animal manure (n=250)	36.2	68.6	14.4	6.4	7.4
Green manure (n=171)	58.8	19.1	41.2	2.9	16.2
Fertiliser (n=82)	4.1	82.4	16.2	2.7	4.1

5.3 Practices to protect the soil, water and crops

5.3.1 Knowledge and practices according to EA potential

There are several techniques that are used to protect or improve the soil, water (rain water or otherwise) and crops (either in the fields or after harvest). In this survey, respondents were asked about five specific practices namely irrigation, soil and water conservation, use of pesticides, rain water harvesting and integrated pest management (IPM - using both chemical and biological methods). Generally, integrated pest management and rainwater harvesting techniques are known by very few people in the areas where the study was conducted (29% for rain harvesting and 11% for IPM (Table 31 below). There were no major differences across the EPA/village categories in both knowledge as well as adoption rates for all the techniques that were asked.

Table 31: Knowledge and adoption of protective practices for water, soil and crops according to EPA/village

	Knowledge EPA/village potential				Practice EPA/village potential			
	HP	MP	LP	Total	HP	MP	LP	Total
Irrigation	98.0	97.0	93.9	96.5	39.0	38.2	30.3	36.4
Soil/water conservation	98.0	89.4	87.9	91.2	72.0	62.3	68.7	66.3
Use of pesticides/herbicides	82.0	87.9	69.7	81.9	15.0	31.7	18.2	24.1
Rainwater harvesting	24.0	28.1	34.3	28.6	4.0	2.5	9.1	4.5
Integrated pest management	10.0	10.6	11.1	10.6	2.0	4.0	1.0	2.8

5.3.2 Knowledge and practices according to sex of head of household

There were generally no major differences in the knowledge and adoption levels of irrigation, soil and water conservation techniques, use of pesticides, rainwater harvesting and IPM between MHH and FHH. Both knowledge and adoption rates were high for soil and water conservation and irrigation but knowledge of pesticides was generally high for (82%) while adoption was low (24%). Table 32 below presents the details.

Table 32: Knowledge and adoption of protective mechanisms for water, soil and crops

	Knowledge			Practices		
	Sex of heads of households			Sex of heads of households		
	Male	Female	Total	Male	Female	Total
Irrigation	97.1	94.5	96.5	38.8	28.6	36.4
Soil/water conservation	91.2	91.2	91.2	66.1	67.0	66.3
Use of pesticides/herbicides	84.7	72.5	81.9	27.7	12.1	24.1
Rainwater harvesting	30.0	24.2	28.6	3.9	6.6	4.5
Integrated pest management	10.4	11.0	10.6	2.6	3.3	2.8

5.3.3 Reasons for not using certain techniques to enhance or protect water, soil and crops

Cost as a deterrent factor was associated with use of pesticides (91%) and irrigation (53%) compared to soil and water conservation and water harvesting techniques, 1% and 24% respectively (Table 33). In some parts of Malawi, communities operate irrigation and water harvesting projects at village level but in the present scenario, 24% of the respondents were not practicing irrigation because they thought there was no communal support for that (either there was no such schemes or just that they not party to any of such initiatives).

Table 33: Reasons for not practicing techniques to protect or enhance water, soil and crops

					Practice abandoned	
	Labour	Costs	Not relevant	No communal support	Temporal	Forever
Water & soil conservation (n=99)	21.7	1.1	71.7	4.3	8.7	25.0
Pesticides (n=230)	13.5	91.4	13.1	1.4	3.6	1.9
Water harvesting (n=96)	48.0	23.5	35.7	16.3	1.0	3.1
Irrigation (239)	52.1	53.3	9.0	24.0	3.0	2.4

5.4 Sources of knowledge for various farming techniques

Table 34 below shows main sources of knowledge for the various techniques that respondents were asked during the survey. What is more important to note is the role of the family in sharing information about the various techniques and decimal appearance of extension services/NGOs in the results especially among the practices that have become almost traditional such as mixed cropping, intercropping, breaking the hard pan etc. Mass media (TV and radio) were decimally mentioned as main sources of knowledge about the various techniques and only appeared slightly more on rainwater harvesting (5%).

Table 34: Main sources of knowledge about the various farming techniques

	Family	Fellow farmer/friend	NGO/Extension agent	TV/newspaper	Other
Land preparation/cropping					
Crop rotation	64.5	9.4	23.4	1.2	1.5
Mixed cropping	90.1	5.0	3.6	0.0	1.3
Intercropping	84.6	8.1	6.9	0.0	0.4
Fallowing	78.7	10.1	11.2	0.0	0.0
Improved fallowing	62.5	11.1	23.6	1.4	1.4
Zero tillage	90.8	3.7	4.6	0.0	0.9
Breaking the pan	81.3	4.4	12.7	0.4	1.2
Improved planting practices	86.5	5.6	7.6	0.0	0.3
Soil fertility practices					
Animal manure	62.7	12.7	23.9	0.0	0.7
Green manure	67.5	5.0	25.5	1.0	1.0
Chemical fertiliser	72.7	4.8	21.8	0.0	0.7
INM	45.9	8.3	44.0	0.9	0.9
IPM	33.3	8.3	58.3	0.0	0.0
Agroforestry	31.0	13.2	53.1	1.0	1.7
Protective practices					
Soil & water conservation	60.7	7.1	31.1	0.0	1.1
Pesticides	23.2	17.9	57.9	0.0	1.0
Rainwater harvesting	33.3	9.5	52.4	4.8	0.0
Irrigation	54.1	14.2	29.1	0.7	1.9

5.5 Food Storage and Preservation

Drying is a method that is often used to preserve food crops in most parts of Malawi and sub-Saharan Africa. During the survey, respondents were asked to state the type of facility which they normally use when drying their produce. Half of the households use bags/mats or tarpaulins where they put/spray their produce for drying, more so in LP EPAs/villages (92%) and the MP EPAs/villages (48%). In the HP EPAs/villages, the majority either leave their crops standing until they dry off or they cut and pile them waiting for drying and eventual harvesting. There were generally no differences observed between MHH and FHH on the drying materials or procedures (Table 35).

Table 35: Places where households dry their food crops

	EPA/village potential			Sex of head		
	High (n=100)	Medium (n=199)	Low (n=99)	MHH (N=307)	FHH (n=91)	Total (N=398)
On the ground	27.0	17.1	6.1	16.9	16.5	16.8
Tarmac road	1.0	2.5	0.0	1.3	2.2	1.5
Bags, tarpaulins, mats	12.0	47.7	91.9	48.5	53.8	49.7
Concrete drying floor	1.0	0.5	0.0	0.3	1.1	0.5
Field (left or cut and pile)	59.0	32.2	2.0	32.9	32.2	31.4

5.6 Means of storing food crops

With regard to food storage, the majority of HH in the MP (80%) and LP (94%) EPAs/villages use bags which they keep inside their houses whereas in the HP, they use mainly granaries (58%). There were generally no differences in the storage methods between MHH and FHH as Table 36 below illustrates.

Table 36: Means of storing food crops

	EPA/village potential			Sex of head		
	High (n=100)	Medium (n=199)	Low (n=99)	MHH (N=307)	FHH (n=91)	Total (N=398)
Bags inside house	40.0	79.9	93.9	71.7	79.1	73.4
Granary	58.0	19.1	4.0	26.7	19.8	25.1
Bags in a proper store	0.0	1.0	2.0	1.3	0.0	1.0
Other	2.0	0.0	0.0	0.3	1.1	0.5

Households generally put their food (or food produce) inside their homes at some (or for some, throughout). Respondents were then asked to state where they put the bags whether straight on the floor, on pallets, under the ceilings or on other objects. Pallets are generally used to keep bags afloat so as to allow air flow as well to keep the produce safe from water as in rural Malawi most households use the same households for other activities including storing water (Table 37). Generally, no major differences were observed between MHH and FHH with regard to their food storage practices although proportionately more FHH tend to put their produce straight on the floor (28%) than MHH (17%).

Table 37: Means of stocking bags inside houses/homes

	EPA/village potential			Sex of head		
	High (n=100)	Medium (n=199)	Low (n=99)	MHH (N=307)	FHH (n=91)	Total (N=398)
Straight on the floor	11.2	19.6	26.3	16.6	28.1	19.2
On pallets	85.7	71.6	68.7	76.8	66.3	74.4
Other	3.1	8.8	5.1	6.6	5.6	6.4

With regard to treating or protecting the food produce with insecticides or other chemicals from insects or rodents, 65% of the households indicated that they do apply some chemicals and mainly for maize. However, use of such chemicals was found lower in the HP EPAs/villages (42%) compared to the MP (66%) and LP (84%) EPAs/villages and the practice was also higher among MHH (68%) than FHH (52%).

5.7 Access to Institutional Support

5.7.1 Extension services

Extension services were not available for 58% of the households in the last farming season and generally no differences across the EPAs/villages or between male and female headed households. This refers to extension services provided by both the government or NGOs or the private sector. Where the services were received, rarely were they paid for and this generally reflects the public-based extension services that Malawi has as opposed to private-led extension services or services that are demand-driven. Details of access levels are presented in Table 38 below.

Table 38: Proportion of households reporting accessing extension services in last farming season

		EPA/village potential			Sex of heads of households		
		High (n=100)	Medium (n=199)	Low (n=99)	Male (n=307)	Female (n=91)	Total (N=398)
Government	never	62.0	57.3	54.5	57.0	60.4	57.8
	rarely	26.0	30.2	36.4	30.9	29.7	30.7
	regularly	12.0	12.6	9.1	12.1	9.9	11.6
NGO							
	never	92.0	84.9	92.9	87.6	92.3	88.7
	rarely	6.0	14.1	7.1	11.1	7.7	10.3
	regularly	2.0	1.0	0.0	1.3	0.0	1.0
Paid	no	97.6	98.9	91.3	97.9	91.7	96.6
	yes	2.4	1.1	8.7	2.1	8.3	3.4

5.7.2 Farm Credit

Generally prices of farm inputs are beyond the affordability of most smallholder farmers in Malawi or even those in low wage employment. As such, opportunities for farm credit offer relief to those seeking to use the inputs, which generally involves is almost all the farmers but opportunities differ. In the survey, respondents were asked if they (the respondents) or some members of their households obtained an agricultural-related credit in the last season and the response was overwhelmingly 'No', at least for three quarters of the respondents (75%). Details are shown in Table 39 below and it would appear households in HP EPAs/villages had relatively more opportunities (42%) than households in the MP (25%) or LP (7%) EPAs/villages.

Table 39: Proportion of households with household members that obtained a farm-related loan in last farming season

	EPA/village potential			Sex of household head		
Any credit?	High	Medium	Low	Male	Female	Male
No	58.0	74.6	92.9	71.8	85.7	75.0
Yes	42.0	25.4	7.1	28.2	14.3	25.0

5.8 Summary

The findings presented in this Chapter have shown that:

- Awareness of various farming techniques/methods that would improve yields is generally very high (>70% except for rain water harvesting (24%) and integrated pest management (10%). However, despite the high levels of awareness, the mismatch between knowledge and adoption is wide (adoption in at one third levels of awareness) mainly arising from economic reasons, constraints with landholdings and limited access to institutional support (extension and credit);
- Both public and private extension services were decimally accessed in the 2006/07 farming season and households that reported knowing modern methods of farming learnt them mainly through family and community networks (>70% of the cases); NGOs and extension services (~12-20%) and decimally from the radio/TV (<1%);

- Access to institutional support was very low; extension services were accessed by ~40% of households and farm credit by ~14-25% in 2007.

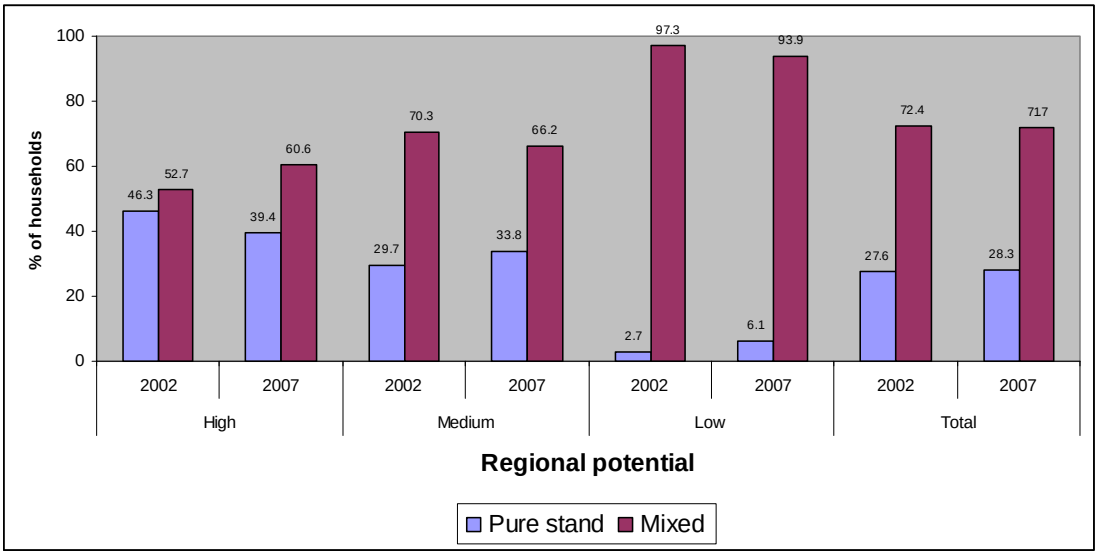
6.0 MAIZE PRODUCTION AND MARKETING

This Chapter is focussed on maize production and marketing conditions. The discussion centres around land allocation to maize vis-à-vis other crops, adoption and use of selected technology and inputs and access to markets for maize. While the discussion is primarily on the 2007 data, reference is also made to the 2002 baseline study so as to assess any trends in maize production and marketing conditions.

6.1 Cropping practices

The first question to the respondents was whether maize in the 2006/07 season was grown in a pure stand or as mixed with other crops. A similar question was also asked in the 2002 baseline survey. The findings, as illustrated in Figure 10 below, showed that households generally prefer growing maize in mixed fields, 72% both in 2002 and 2007. There were some insignificant changes in all the EPA/Villages, either reducing or increasing mixed cropping but the net effect has been the same proportion in the end (72%). In 2007, the proportions of MHH that grew maize in pure stand were 29% and 24% for MHH and FHH, respectively, and no much changes occurred compared to the status in 2002.

Figure 10: Proportion of households growing maize in pure or mixed stand in 2002 and 2007



6.2 Amount of land allocated to maize

Land allocation (average) to maize in 2002 and years 2004-07 season according to potential of the EPA/village and sex of heads of households was as shown in Table 40 below. Households in the HP EPAs/villages had been allocating higher amount of land compared to households in the MP and LP EPAs/villages throughout the years under observation. The mean land allocation to maize had been significantly higher in 2002 and 2005 but not significant in 2006 and 2007 especially between households in HP and MP EPAs/villages. MHH households on the other hand have been allocating large amount of land than FHH and the mean differences were non-significant only in 2002 but have since then been significantly different in 2005, 2006 and 2007. On the overall, land allocation to maize has been declining from 0.81 ha on average in 2002 to ~0.75ha in 2007.

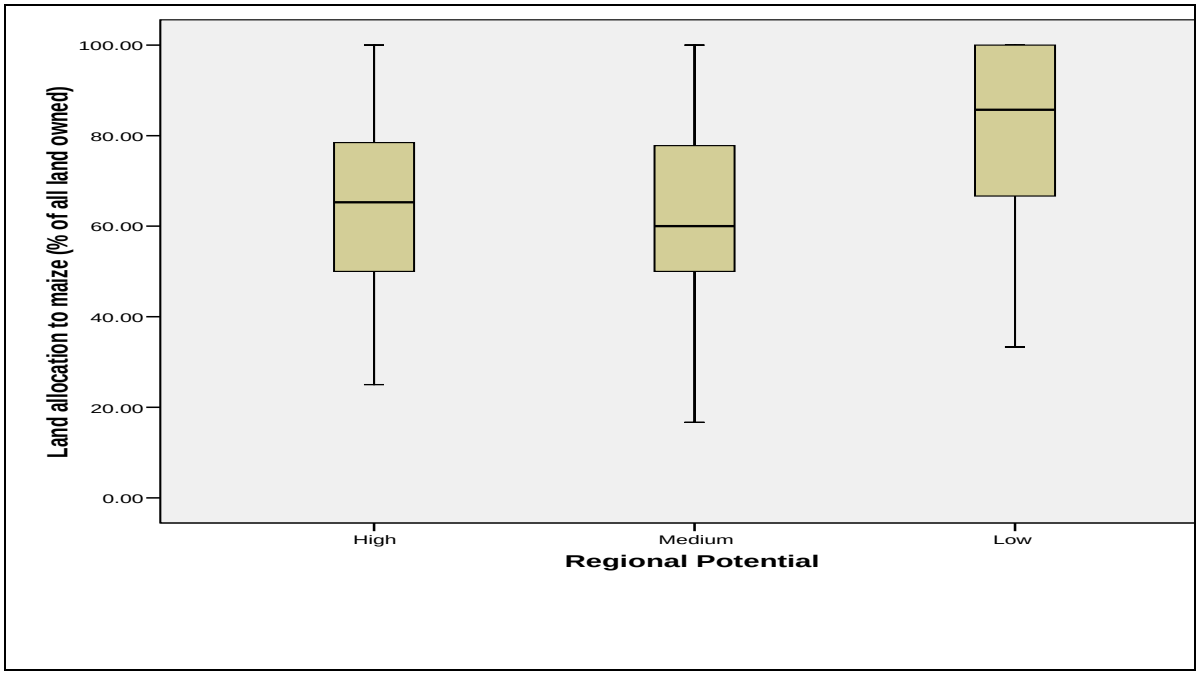
Table 40: Land allocation to maize in 2002 and 2005-07

		EPA/village potential			Sex of household heads		
		HP	MP	LP	Males	Females	Total
2002	Mean (ha)	1.05	0.75	0.68	0.82	0.78	0.81
	95% CI	0.93-1.18	0.68-0.82	0.61-0.75	0.76-0.87	0.67-0.89	
2005	Mean (ha)	0.86	0.70	0.63	0.75	0.61	0.72
	95% CI	0.77-0.94	0.64-0.75	0.55-0.71	0.70-0.81	0.54-0.68	
2006	Mean (ha)	0.84	0.71	0.65	0.78	0.57	0.73
	95% CI	0.75-0.92	0.66-0.77	0.57-0.73	0.73-0.83	0.51-0.63	
2007	Mean (ha)	0.89	0.73	0.67	0.81	0.56	0.75
	95% CI	0.79-0.99	0.67-0.79	0.59-0.76	0.76-0.86	0.50-0.62	

6.3 Proportion of land allocated to maize

Although households in the LP EPAs/villages allocated lower amounts of land to maize (0.67 ha on average), they actually had allocated 83% (95% CI: 79.3-86.5%) of their land holdings compared to 64% among households in the HP (95% CI: 60.3-67.7%) and 63% among households in MP (95% CI: 60.4-66%) EPAs/villages (Figure 11). This simply shows the constraints that households in the LP EPAs/villages generally face with regard to landholdings.

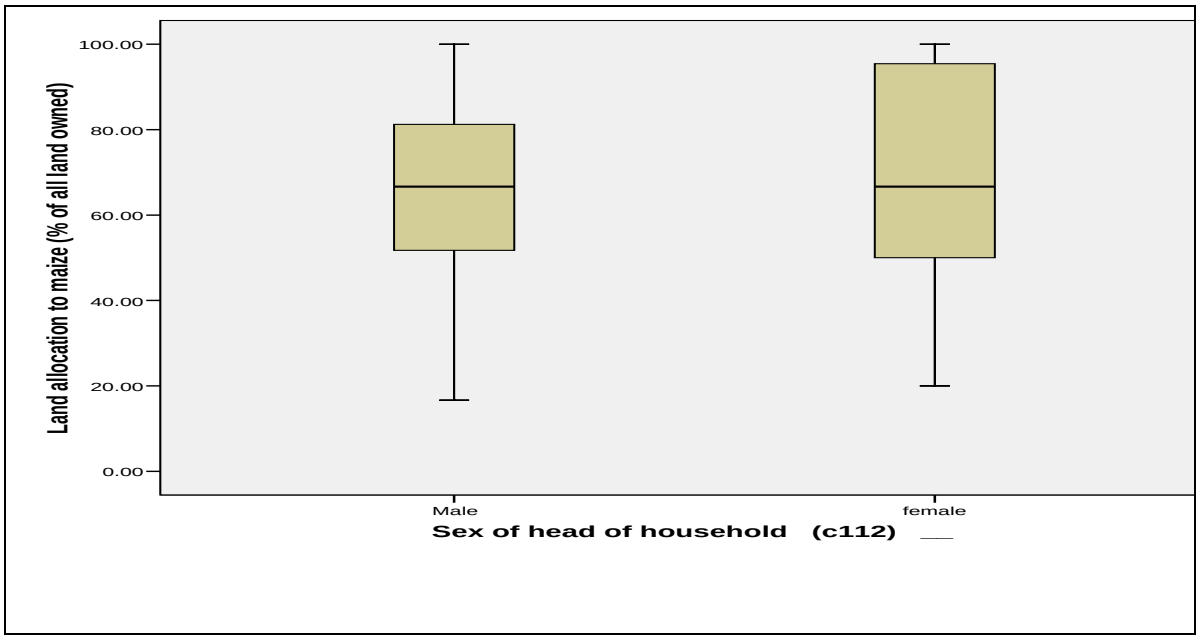
Figure 11: Proportion of land allocated to maize disaggregated by EPA/village potential



Note: Each box and whisker plot shows mean (Bold line in centre of box), lower and upper quartile (lower and upper ends of the boxes) and range (lower and upper end of the lines).

Land allocation to maize in the 2006/07 farming seasons was not significantly different between MHH and FHH. On average, MHH allocated 68% of their land to maize (95% CI: 65.7-70.3%) whereas among FHH, the average land allocation was 69% (95% CI: 64.4-74.2%). Figure 12 below shows the median land allocation and range according to sex of heads of households.

Figure 12: Proportion of land allocated to maize disaggregated by sex of heads of households



Note: Each box and whisker plot shows mean (Bold line in centre of box), lower and upper quartile (lower and upper ends of the boxes) and range (lower and upper end of the lines

6.4 Maize Yields

This section looks at maize yields among the sampled households in comparison with yields that are achievable under research conditions and national yields for years 2000-2002 and 2005-2007. The analysis in this section includes only households that had data across the years 2000-02 and 2005-07. Research conducted in Malawi and elsewhere has shown that composite and hybrid varieties have the potential to yield between 6 and 10 tones per hectare while local varieties have the potential to yield 1 ton per hectare (Phiri et al 1999). National maize production and hectarage data was also obtained for the years under observation from FEWSNET.

6.4.1 Overall maize yields among the households in the sample

A percentile analysis of the maize quantities produced by each household (per hectare) was conducted disaggregated by the EPA/village potential for the year 2000-2002 and years 2005-07 as shown in Table 41 below. In 2000, the worst 5% of the households in the HP EPAs/villages produced 0.3 tonnes of maize per hectare. The yields dropped to 0.23 tonnes/ha in 2001 and went up slightly to 0.26 tonnes/ha in 2002 and has not changed since then into 2007. Looking on the upper side, the best 95% performers in the HP EPAs/villages only managed 4.22 tonnes of maize per hectare in 2000, slumping down to 2.67 tonnes/ha in 2001 and to 2.35 tonnes/ha in 2002 before picking up in 2005 at 3.41 tonnes/ha and have remained stuck at that level of yields into 2007.

Comparing across the three groups of EPAs/villages, the HP EPAs/villages have generally maintained their superiority in terms of production per hectare (yields) over the years 2000-2002 and 2005-07 but the MP EPAs/villages have slumped below the levels of the LP EPAs/villages in the same period. A common observation to all the groups of EPAs/villages is the 'slump' in the period 2000 to 2002 and this is the period that Malawi had experienced the worst famine in the post-independence period and the findings from this study are just mirroring the national situation in that period. Again, a similar but minor slump was also

experienced in the years 2005-06 and it would appear the households had not recovered from those successive slumps in their yields.

Table 41: Maize yield in years 2000-02 and 2005-07

Year	Potential	Percentiles						
		5	10	25	50	75	90	95
2000	High	0.30	0.46	0.62	1.09	1.75	2.45	4.22
	Medium	0.08	0.25	0.46	0.74	1.16	1.85	2.09
	Low	0.08	0.29	0.42	0.74	1.36	2.12	2.69
2001	High	0.23	0.26	0.54	0.82	1.24	2.05	2.67
	Medium	0.12	0.19	0.39	0.69	1.00	1.36	1.54
	Low	0.19	0.22	0.37	0.68	1.04	1.50	2.16
2002	High	0.26	0.34	0.56	0.82	1.16	1.85	2.35
	Medium	0.00	0.04	0.37	0.59	0.94	1.33	1.63
	Low	0.20	0.27	0.37	0.76	1.28	2.03	2.66
2005	High	0.24	0.31	0.49	0.85	1.48	2.63	3.41
	Medium	0.23	0.32	0.61	0.99	1.48	2.22	2.47
	Low	0.33	0.42	0.62	0.99	1.61	2.68	3.82
2006	High	0.24	0.31	0.49	0.84	1.48	2.58	3.41
	Medium	0.23	0.30	0.57	0.99	1.48	2.22	2.47
	Low	0.32	0.38	0.62	0.99	1.57	2.46	3.26
2007	High	0.24	0.30	0.48	0.82	1.48	2.30	3.41
	Medium	0.19	0.29	0.54	0.99	1.45	2.22	2.37
	Low	0.29	0.38	0.62	0.98	1.52	2.46	3.09

6.4.2 Gaps in yield achievement (yields by households versus potential/research yields)

As discussed above, between 6 and 10 tonnes of maize per hectare could be produced with proper maize production practices including use of improved varieties, early planting, proper weeding, fertilisation, control of cross-breeding and pest control. It was therefore decided to conduct a yield gap analysis so as to assess how far or close the households in the study were to achieving the potential yields per hectare. In this analysis, yield gaps were estimated for each household using the lower limit of the potential yields possible with improved varieties (6 tonnes per hectare) just to determine the jump that is needed for the households to get into the potential band.

In 2000, half of the households only managed to produce 14% of the potential yields per hectare and the yields achieved were 18% in the HP EPAs/villages compared to 12% in both the MP and LP EPAs/villages (Figure 13 below). Between 2001 and 2002, all households experienced a drop but the 'nose-diving' was felt highly in the HP EPAs/villages to 14% of the potential yields (down from 18% in 2000) where as in the MP and LP EPAs/villages the drops were from 12% in 2000 to ~11% in 2001. While households in the MP and LP EPAs/villages managed to regain their yields in 2005 to somewhere around 17% the households in the HP were still struggling at ~14% and the situation has remained the same into 2007.

Figure 13: Percent yield achievement (median) in 2000-02 and 2005-07 disaggregated by EPA/village potential

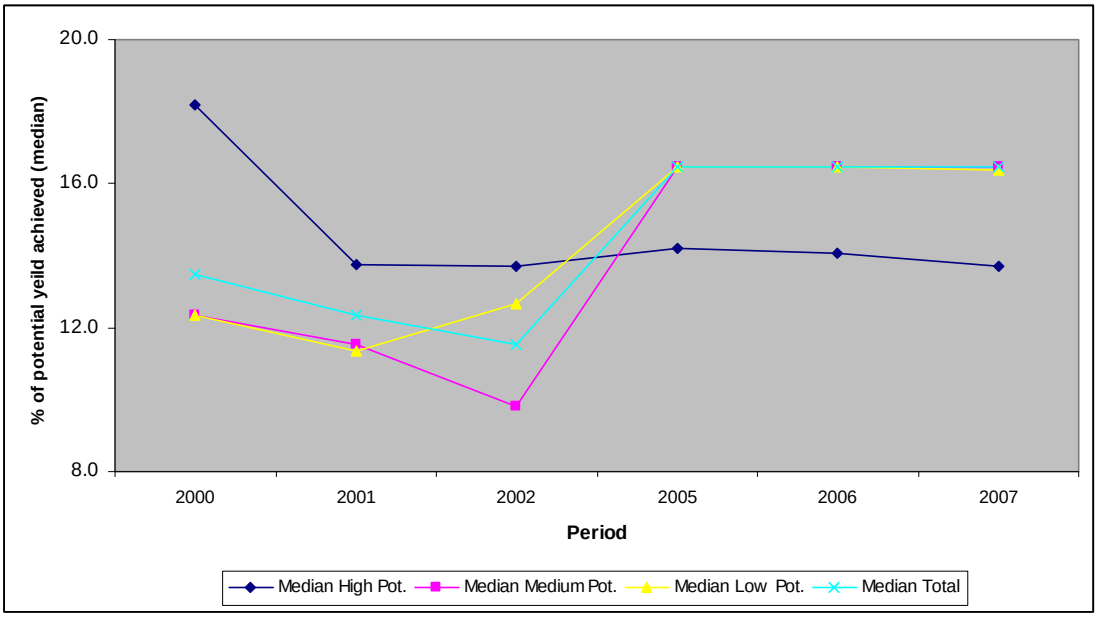
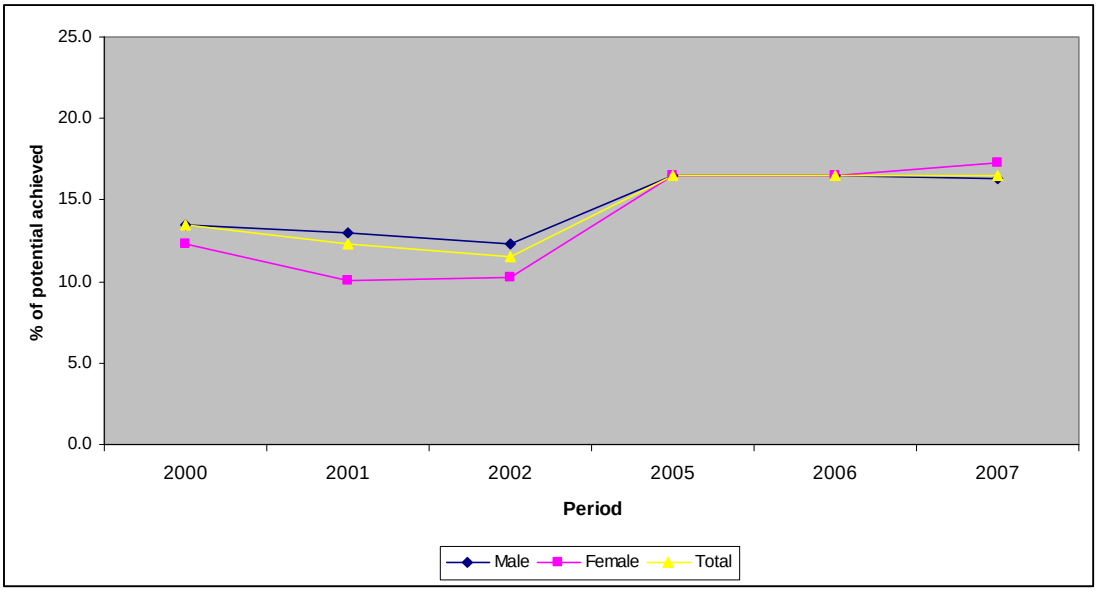


Figure 14 below shows the yield achievement (% median) of the households in the study disaggregated by sex of head of household. In 2000, MHH achieved only 14% of potential yields (median); this dropped to 13% in 2001 and has been rising since to ~16% into 2007. For FHH, the yield achievement in 2000 was 12%; this dropped to 10% in 2001 and remained the same in 2002 but has been rising as well to around 17% into 2007. However, the trends between MHH and FHH in general were not significantly different ($p<0.05$).

Figure 14: Percent yield achievement (median) in 2000-02 and 2005-07 disaggregated by sex of head of household



6.4.3 Proportional achievement across the years

The trends presented in Figures 14 above were aggregate and could not reveal inter-gender variations across the years of observation. This section compares the trends within MHH and within FHH using proportionate achievements in each sub-category over the periods 2000-02 and 2005-07. Yield achievement was categorised into six levels: those achieving <10% of potential yields and those achieving 10-19%; 20-29%; 30-39%; 40-49% and those achieving >50 of potential yields.

In 2000, 34% of the households achieved less than 10% of the potential yields per hectare, this proportion rose to 42% in 2002 and remained fairly the same in 2002 before dropping to 26-28% between 2005 and 2008. As would be observed in Figure 15 below, the worst achievers increased in their proportions while the best achievers decreased in the period 2001-2002 before making some up-strides between 2005 and 2007. What is also worth noting from Figure 15 is the proportion of households achieving 10-19% of potential yields which has remained fairly constant for all the years under observation (~34-38%).

Figure 15: Proportion of households achieving <10%, 10-19%, 20-29%, 30-39%, 40-49% and >=50% of potential yields in 2000-02 and 2005-07

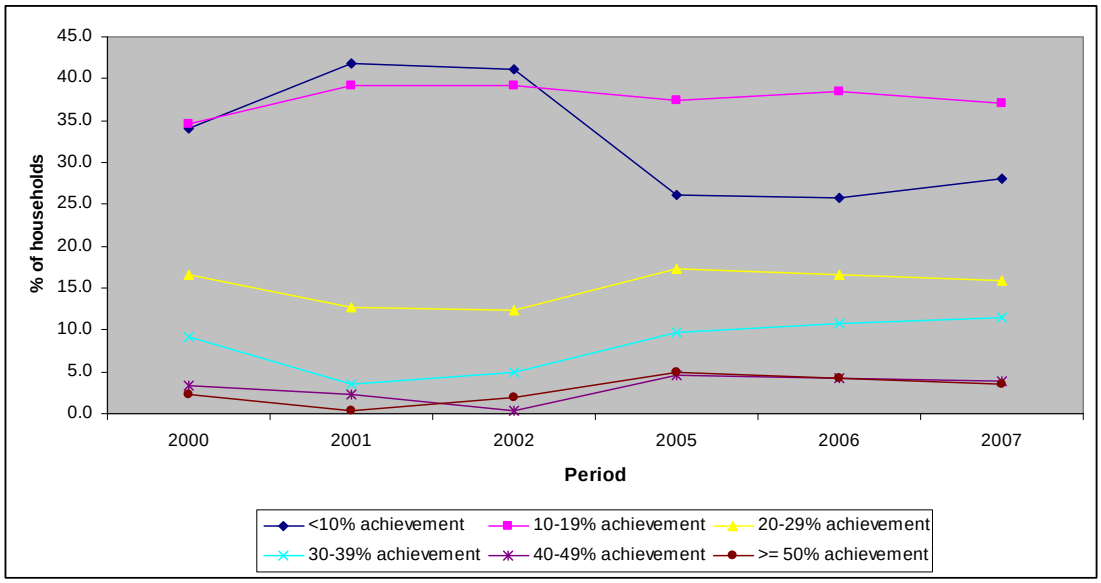


Figure 16 below shows yield achievement in MHH in 2000-02 and 2005-07 while Figure 17 shows the same trends in FHH. In 2000, 34% of both MHH and FHH achieved less than 10% of potential yields. The proportion among MHH rose to 39% in 2001 while among FHH the proportion rose to 50%, both proportions remained fairly the same (2001 levels) in 2002 before dropping to 24% among MHH and to 33% among FHH.

What is also striking from the findings presented in the two Figures, is the commonality in the sense that both MHH and FHH registered almost no household that achieved 50% of potential yields in 2001 but there was some slight improvement among MHH to 2% in 2002 and both experienced some improvements (though minor) in the period after 2005.

Figure 16: Proportion of MHH achieving <10%, 10-19%, 20-29%, 30-39%, 40-49% and >=50% of potential yields in 2000-02 and 2005-07

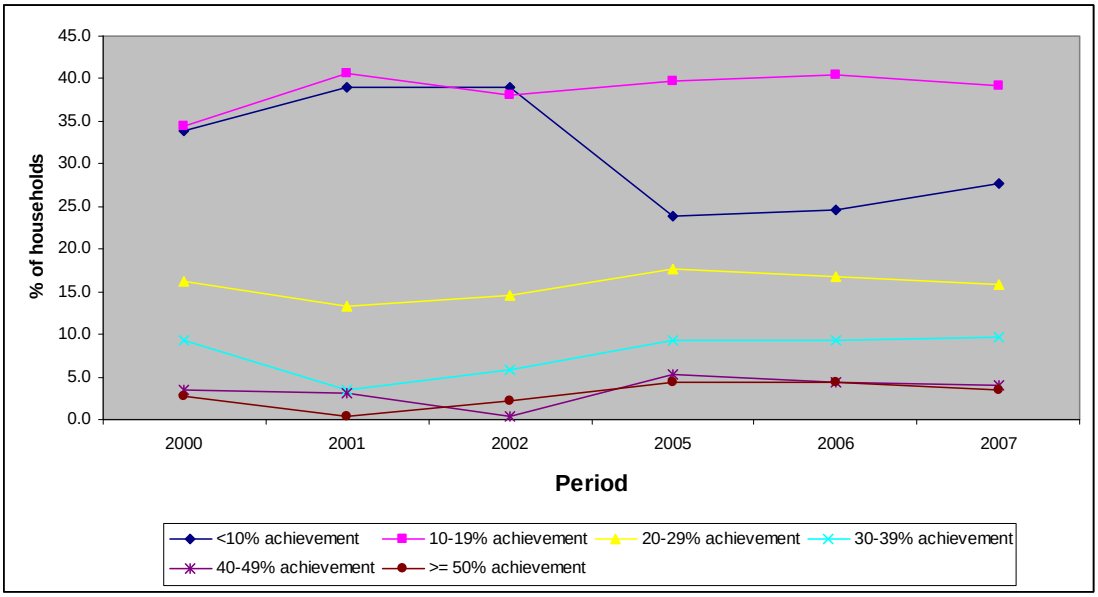
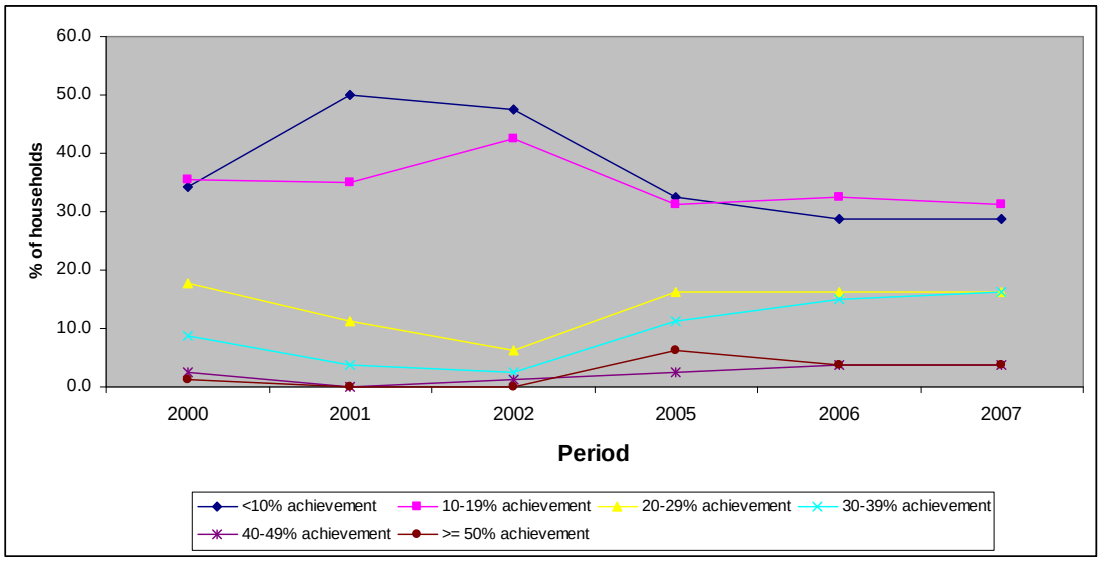


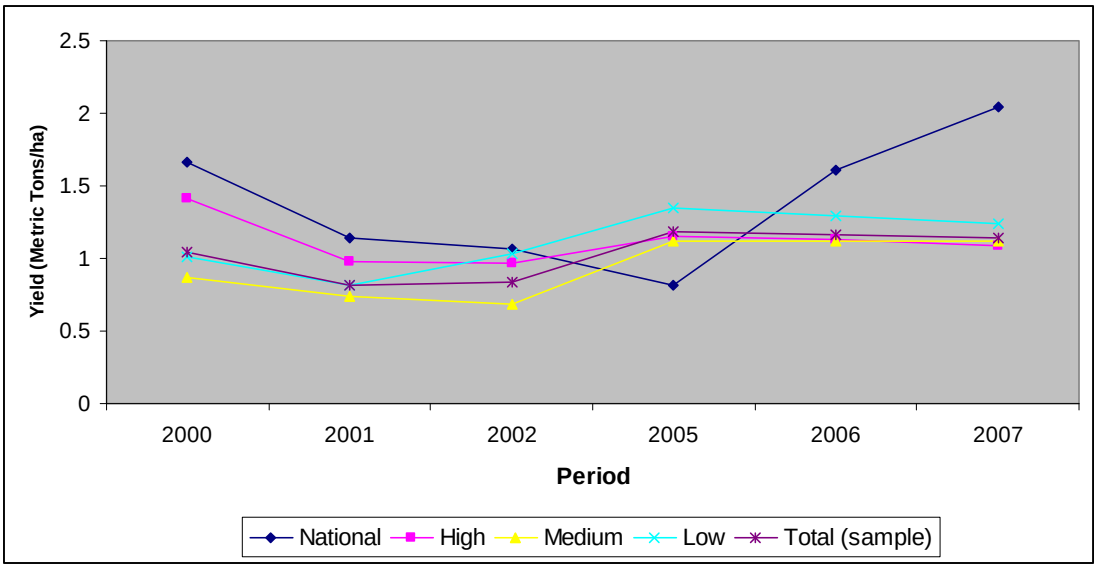
Figure 17: Proportion of FHH achieving <10%, 10-19%, 20-29%, 30-39%, 40-49% and >=50% of potential yields in 2000-02 and 2005-07



6.4.4 Maize Yields in Households versus National Production Levels

Figure 18 shows the maize yield comparison for the households in the survey and national estimates for the periods 2000-02 and 2005-07 in metric tonnes/hectare. Generally, the households in the sampled have been underperforming compared to the national averages across the years except in the 2005 season when the national estimates were 0.81 metric tonnes per hectare while the households in general had over 1 tonne/ha in the same year. As discussed above, households in the HP EPAs/villages performed fairly well in the years 2000-01 (above other EPAs/villages) but were overtaken by households in the LP EPAs/villages in 2002.

Figure 18: Comparison of maize yields between households in the sample and national estimates for years 2000-02 and 2005-07



6.4.5 Proportionate achievement against national estimates

Table 42 below shows the yield achievement (in %) among the households in the survey in comparison to the national yield estimates for years 2000-02 and 2005-07. In 2000, households in the HP EPAs/villages on average achieved 85% of the national yield of 1.66 tonnes per hectare (95% CI: 68.3-102.1%) This achievement was significantly higher than households in the MP EPAs/villages which on average achieved 53% of national estimates (95% CI: 47.2-58.3%) but was not that significant compared to the households in the LP EPAs/villages which on average achieved 61% (95% CI: 47.9-74.4%). What is interesting to note from the statistics presented in Table 42 below is that within each EPA/village, some households managed to beat the national estimates by 4.7 times in the HP EPAs/villages, 1.79 in the MP EPAs/villages and 3.63 times in the LP EPAs/villages.

Table 42: Comparison of maize yields between households in the sample and national estimates (% achievement) for years 2000-02 and 2005-07

			EPA/village potential		
			HP (n=78)	MP (n=154)	LP (n=74)
2000	Mean		85.2	52.8	61.1
	95% Confidence Interval for Mean	Lower Bound	68.3	47.2	47.9
		Upper Bound	102.1	58.3	74.4
	Minimum		16.1	0.0	0.0
	Maximum		474.3	178.6	363.1
2001	Mean		86.0	65.0	71.2
	95% Confidence Interval for Mean	Lower Bound	73.0	58.5	58.7
		Upper Bound	99.0	71.5	83.8
	Minimum		12.6	0.0	0.0
	Maximum		260.0	218.8	294.7
2002	Mean		90.8	63.7	96.9
	95% Confidence Interval for Mean	Lower Bound	76.8	55.5	74.6
		Upper Bound	104.8	72.0	119.2
	Minimum		11.5	0.0	12.0
	Maximum		346.3	378.6	664.8
2005	Mean		141.7	138.7	166.5
	95% Confidence Interval for Mean	Lower Bound	115.1	124.1	133.6
		Upper Bound	168.4	153.3	199.4
	Minimum		13.6	8.7	22.9
	Maximum		548.9	548.9	792.8
2006	Mean		70.1	69.7	80.1
	95% Confidence Interval for Mean	Lower Bound	57.0	62.1	64.2
		Upper Bound	83.2	77.3	96.0
	Minimum		6.8	4.4	11.5
	Maximum		276.1	276.1	398.9
2007	Mean		53.3	54.8	60.5
	95% Confidence Interval for Mean	Lower Bound	43.5	48.4	49.1
		Upper Bound	63.1	61.3	71.9
	Minimum		5.4	3.5	12.1
	Maximum		193.7	302.7	314.8

All EPAs/villages beat the national averages in 2005 but slumped back in 2006 and 2007 when al households have been producing ~ half of the national averages. From 2005 to 2007, the average yield achievements for the households in the three EPAs/villages have

differed in favour of the LP EPAs/villages but the differences have not been significant, generally (see the 95% CI for each category and year).

6.5 Maize sales

Table 43 below shows the proportion of households that reported selling part of their maize produce in 2007. One third (33%) of the households reported selling maize in the season, 25% in the MP EPAs/villages, 37% in the HP and 44% in the LP EPAs/villages. There were proportionately more households that sold maize among MHH (35%) than among FHH (25%).

Table 43: Proportion of households that sold part of their maize produce in 2007 and proportion of maize that was sold

	EPA/village potential			Sex of heads of households		
	High	Medium	Low	Male	Female	Total
no	63.0	74.9	55.6	64.8	74.7	67.1
yes	37.0	25.1	44.4	35.2	25.3	32.9
Proportion of maize sold						
Mean	26.4	24.0	26.3	26.1	22.3	25.4
Median	20.0	21.1	23.1	22.2	21.4	22.2

Generally, households sold on average a quarter of their maize produce in 2007 (median 22%). There was relatively more selling of maize among MHH and households in the LP and HP EPAs/villages compared to their counterparts. Details are presented in Table 43 above.

6.6 Maize prices in US$ per 100kg

Prices of maize in Malawi are sometimes used as sign of scarcity of the commodity because they generally tend to vary across the year. Lower prices are observed in the period of harvesting between May and July/September and they tend to rise sharply from November reaching climax around December-February with January and February considered as the worst. The questions on prices at which maize was sold did not ask for the specific months during which the maize was sold. As such, this section just presents an overall picture.

Prices of maize in Malawi are, by policy, supposed to be stabilised under the maize price stabilisation fund which is maintained by the government through the National Food Reserve Agency. ADMARC plays an important role in setting some minimum buying prices of maize from the farmers and some ceiling prices when re-selling the commodity to the farmers. However, what happens in reality is different because of late, ADMARC functions in price stabilisation (and other areas) have been dwindling arsing mainly from poor economic performance and declining government support. In 2006 and 2006, the minimum selling price of maize set by the government has been ~K12.00 to K15 per kilogramme (or K1,200 per 100kg of maize at minimum; in US$ at US$8.58 per 100kg using the 2006 exchange rate of US$1=K140).

The prices at which households in the survey sold their maize in 2006 and 2007 are shown in Table 44 below. On average, households in the HP EPAs/villages sold maize at US$11.3 per 100kg in 2006 and at US$12.7 in 2007 using dollar rate of (US$1=K140 which has stabilised in the two years). In the MP EPAs/villages, the prices were US$12.6 and US$13.9 per 100kg for 2006 and 2007, respectively. In the LP EPAs/villages, the prices were US$16.7 and US$18.5 per 100kg in 2006 and 2007, respectively. The differences likely are likely to have arisen from two main sources (1) availability of the commodity (high in the HP EPAs/villages in general) and (2) urban or remoteness of the EPAs/villages (LP EPAs/villages are close to Blantyre town than the HP EPAs/villages which are in the remote areas of central region).

Table 44: Prices at which maize was sold by the farmers in 2006 and 2007 in US$ per 100kg

EPA/village or sex of heads of households		2006	2007
High	Mean	11.3	12.7
	Median	11.1	13.3
	Minimum	7.4	7.4
	Maximum	25.9	25.9
Medium	Mean	12.6	13.9
	Median	10.7	13.3
	Minimum	7.4	7.4
	Maximum	44.4	44.4
Low	Mean	16.7	18.5
	Median	10.5	13.3
	Minimum	7.4	7.4
	Maximum	66.7	66.7
Male	Mean	13.2	14.6
	Median	11.1	13.3
	Minimum	7.4	7.4
	Maximum	59.3	59.3
Female	Mean	15.6	17.8
	Median	9.8	11.9
	Minimum	7.4	7.4
	Maximum	66.7	66.7
Total	Mean	13.6	15.2
	Median	10.9	13.3
	Minimum	7.4	7.4
	Maximum	66.7	66.7

Comparatively, FHH sold their maize at higher prices than their counterparts (MHH) both in 2006 US$15.6 versus US$13.2 per 100kg) and 2007 (US$17.8 versus US$14.6 per 100kg). Details are presented in Table 44 above.

The majority of households both in 2006 and 2007 sold their maize above the minimum prices of US$8.58 per 100kg (81% in 2006 and 95% in 2007). Comparatively, more households in LP EPAs (34%) and FHH (32%) sold their maize at lower prices in 2006 than their counterparts. Details are presented in Table 45 below.

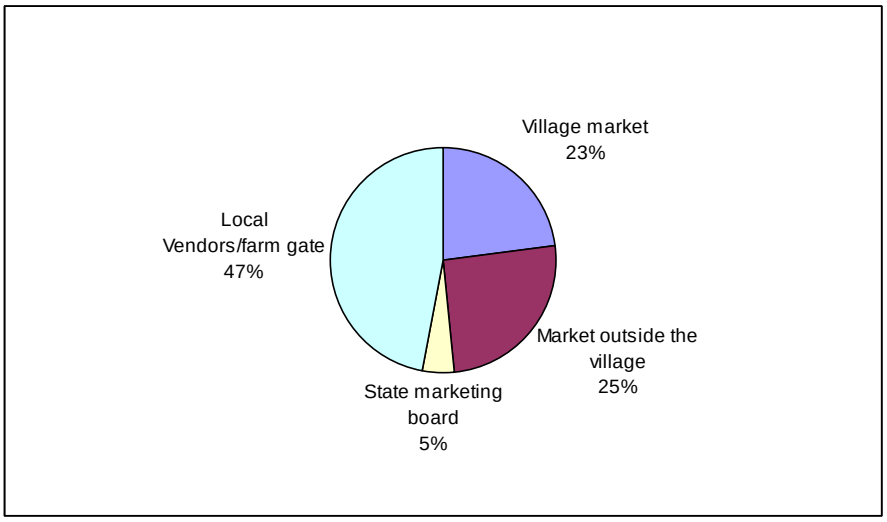
Table 45: Proportion of households that sold their maize at less or more than the official minimum prices in 2006 and 2007

		EPA/village potential			Sex of heads of households		
		High (n=36)	Medium (n=48)	Low (n=44)	Male (n=106)	Female (N=22)	Total (N=128)
2006	<US$8.58/100kg	5.6	14.6	34.1	16.0	31.8	18.8
	>=US$8.58/100kg	94.4	85.4	65.9	84.0	68.2	81.3
2007	<US$8.58/100kg	2.8	2.1	9.1	4.7	4.5	4.7
	>=US$8.58/100kg	97.2	97.9	90.9	95.3	95.5	95.3

6.7 Markets for maize

Generally maize that was sold in 2007 was sold through local vending, where vendors move from village to village and household to household, sometime, they erect a scale at one central location for sellers to bring their produce (47%). Interesting observation from the findings presented in Figure 19 below was the low significance of the state marketing board namely ADMARC which was used by only 5% of the households that sold their maize in 2007 (N=128)

Figure 19: Places where households sold their maize in 2007



6.8 Summary

The findings presented in this chapter have shown that:

- Generally, households in the communities surveyed grow maize in mixed fields with other crops (mainly arising from land constraints and extension messages regarding advantages of mixed cropping and intercropping);
- Size of land allocated to maize has generally been declining in the period of observation (2000 to 2007) mainly as households share their plots with newly emerging households (children getting married and claiming part of family land for their own needs);
- Yield achievement by the households against what is feasible under research conditions has generally been very low (<20% achievement). Yields scrambled in 2001/02 (when Malawi experienced the worst food shortage n modern times) and 2005 and households seemed not to have recovered from these shocks into 2007;
- Prices at which households sold maize was generally higher than the official price in ADMARC (~US$13.6 to US$15.2 per 100kg on average in 2006 and 2007, respectively). This reflects either scarcity of the commodity or better marketing conditions provided by the vendors but the former appears more realistic considering the low yields produced by the households in the same period.

7.0 DISCUSSION OF FINDINGS

The discussion centres on two main issues: prospects and challenges for intensification and farm productivity enhancing conditions including markets and policy support.

7.1 Agricultural intensification, extension services and household characteristics

The AFRINT study aims at assessing how households are intensifying their agricultural production (through adoption of modern technology) and how societal and market factors facilitate or hinder this process of intensification. The analysis of the interactions among farmers (and civil society as a whole) with the state and market actors is important so as to unravel conditions under which household food production would improve in a country such as Malawi. Throughout this report, the importance of gender (or sex) of the heads of households has been highlighted and generally the tabular analyses have shown no major differences on access to modern farming methods that is clearly gender-based even though 14% of FHH had access to extension services in the 2006/07 season compared to 28% among the MHH. Data from the two rounds of data collection in 2002 and 2007 also seems to suggest that landholdings ate also not gender-based at least in the communities that were surveyed. In terms of learning new methods, the findings have shown that people are not accessing the formal services and even the radio/TV are not cited as their main sources where they learnt new methods of farming. Households are increasingly learning new ways of farming from family and community networks rather than the formal extension services or from the radio. This raises the question: what is happening to extension services in Malawi? Further research is required to find better options of delivering extension messages to smallholder farmers who are currently not being reached by the service providers.

With HIV and AIDS (although not observed in this study) but reported in numerous other studies (see Kadzandira 2002; Shah et al 2001), population demographics are changing. Active adults are dying leaving behind young children and the elderly. This implies new types of farming households emerging. It would be good to explore better extension packages that would enhance adoption of modern methods of farming in addition to addressing the barriers discussed in this report. Findings from this study have also show that awareness of various farming techniques/methods that would improve yields is generally very high among the households (mainly from family and community networks). Over 70% of the respondents responded positively to over three quarters of the techniques that were asked except for rain water harvesting which attracted a 'yes' response of 24% and integrated pest management (10%). However, despite these high levels of awareness, the mismatch between knowledge and adoption is wide (adoption is at one third the levels of awareness) mainly arising from economic reasons, constraints with landholdings and limited access to institutional support (extension and credit). As discussed above, the findings have shown that access to both public and private extension services were decimal in the 2006/07 farming season and households that reported knowing modern methods of farming learnt them mainly through family and community networks (>70% of the cases) whereas NGOs and extension services were accessed by ~12-20% of the households and worse so for the radio/TV (<1%). In a country where literacy levels are so low (~60%) especially among females (~40%) than males (~70-75%), who form the largest part of smallholder farmers, the provision of extension services is arguably one of the conditions for adoption of modern methods of farming and intensification. However, provision of extension messages alone cannot improve intensification if the challenges to their adoption (mainly economic) are not addressed. The findings of this study have highlighted that a good proportion of households adopted some techniques in 2002 but have since dropped them, there is need for more research to find out how this process is unfolding: Do smallholder farmers have any more trust in modern farming techniques? Is the drop in adoption rates only economic related or mistrust with extension services.

7.2 Copping patterns, yields and marketing conditions

Maize will remain the main staple for Malawi for the foreseeable future. As such, any policies that increase or decrease its production or availability have a direct bearing on the food situation in Malawi. In the study communities, maize was the dominant crop being grown and the proportions of households growing it between 2002 and 2007 (>99%) have generally not changed. There has been some dropping of cassava (9%), rice (3%) and non-food cash crops (~20%) between 2002 and 2007 mainly on economic reasons (resulting from dissatisfaction with produce prices vis-à-vis levels of investment – time, labour and inputs). On a positive note (from stand-point of food production), there has been declines in the cultivation of non-food cash crops over the same period as more land would be made available to food production although this is also arguable because food security is not a result of food production alone.

Yield achievement by the households against what is feasible under research conditions has generally been very low (<20% achievement) and yields in the surveyed households have generally followed national trends and they don't differ significantly with national estimates. In general the yields in the surveyed households (and at national level) scrambled in 2001/02 (when Malawi experienced the worst food shortage in modern times) and in 2005 and the findings from this study have suggested that households have not recovered from these shocks into 2007. Further research is needed to find mechanisms that would aid households to recover quickly from food production shocks. This raises questions as whether the various safety net programmes, community empowerment programmes (including food or input for work programmes) are really empowering programmes and whether the input subsidy programme (targeted) is one such mechanism (considering the target groups).

Markets are expected to drive production of commodities if prices are better (*ceteris paribus*). In the present study, the findings have shown that generally, prices at which households sold maize was generally higher than the official price in ADMARC (~US$13.6 to US$15.2 per 100kg on average in 2006 and 2007, respectively compared to US$8.58 per 100kg set by the government). This rise in the prices was expected to have triggered production in 2007 but this was not the case as production stagnated around 15-25% of the potential under research conditions. The high prices therefore reflect scarcity of the commodity rather than better marketing conditions provided by the vendors. The eventual demise of ADMARC is also reflected in the modest proportions of households that sold their maize produce through the parastatal organisation in 2007. The challenges of having absence of a government-led organisation would be felt in years when farmers will produce more than has been the case in the years of observation of this study. The market will be over-flooded with maize and being a controlled commodity, externalisation of sales will not be possible at farm-gate levels. Vendors will offer lesser prices than have been the case in 2006/07 because there will be no price floor-control body where farmers would sell their crop produce when the open market is offering low prices (the open market will take advantage of the situation), the end result being discouraging farmers to produce more in subsequent years, eventually returning to low food availability in the country. Low produce prices have been documented in this report as discouraging farmers to produce more non-food cash crops (namely tobacco and cotton). This situation would trickle to food crops if the roles of a price floor body are not taken care of through a deliberate policy as the case with ADMARC has been.

One option of increasing market access for the farmers is encouraging rural-urban and rural-rural linkages. In the present study, there were more rural-urban or rural-rural linkages in the LP EPAs/villages (46%) compared to the HP (22%) and LP (26%) EPAs/villages and this was basically because villages in the LP EPAs were close to Blantyre town. In 44% of the cases, the linkages involved rural-rural interactions whereas in 29% they involve towns outside district of residence and another ~20% they involved towns within the same district. The challenges facing many smallholder farmers in Malawi to sell their produce in urban areas (and other rural areas) revolve around transport and storage. Further research is needed to

explore better ways of preserving farm produce so that it can be transported to other parts of the country without losing form and quality too much.

8.0 8.0 CONSLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

The findings presented in this report have generally shown that:

8.1.1 Agricultural intensification, extension services and household characteristics

- gender (or sex) of the heads of households is not a major factor differentiating knowledge and adoption of modern farming methods; rather people's access to family and community networks as opposed also to access to the formal extension services or from the radio. This finding puts to question whether formal extension functions still exist and in what form they are being provided.
- awareness of various farming techniques/methods that would improve yields is generally very high among the households but despite these high levels of awareness, the mismatch between knowledge and adoption is wide (adoption is at one third levels of awareness) mainly arising from economic reasons, constraints with landholdings and limited access to institutional support (extension and credit).
- there are many factors that affect adoption of modern farming techniques but economic reasons and frustrations with previous efforts (which did not bear expected benefits) seem to dominate reasons for dropping.

8.1.2 Copping patterns, yields and marketing conditions

- unlike maize, there has been some dropping of cassava, rice and non-food cash crops between 2002 and 2007 in the study communities mainly on economic reasons (resulting from dissatisfaction with produce prices vis-à-vis levels of investment – time, labour and inputs).
- Yield achievement by the households against what is feasible under research conditions has generally been very low (<20% achievement) and yields in the surveyed households have generally followed national trends and they don't differ significantly with national estimates.
- Prices for maize offered to farmers in 2006/07 seasons were way above the government floor prices but this does not seem to have triggered more production n 2007. This implies that the higher prices being offered in these seasons only reflect scarcity of the commodity rather than better market conditions.
- The eventual demise of ADMARC is reflected in the modest proportions of households that sold their maize produce through the parastatal organisation in 2007.
- rural-urban and rural-rural linkages exist and they form a a large part of transactions among households in the survey communities.

8.2 Recommendations

More research and thought is needed to understand:

- better ways of providing formal extension services to the smallholder farmers considering the existing literacy and poverty levels. It would be argued that Malawi has rushed to start implementing a demand-driven extension system;
- the mismatch between knowledge and adoption of modern techniques besides economic reasons, constraints with landholdings and limited access to institutional support (extension and credit).
- potential yields for Malawi as the current levels appear too high for achievement by the smallholder farmers;

- revitalise the role of ADMARC as a price stabilising body.

9.0 REFERENCES

-Under Construction -