



**IMPACT OF HIV/AIDS ON INTER- AND INTRA-GENERATIONAL  
INFORMATION FLOWS AMONG SMALLHOLDER FARMERS IN  
MALAWI**

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## Acronyms

ADD	Agricultural Development Division
CARD	Christian Agriculture and Relief Development
CBO	Community Based Organization
CIAT	
CNFA	Citizen Network for Foreign Affairs
CRS	Catholic Relief Services
C-SAFE	Consortium for Southern Africa Food Emergency
DFID	Department for International Development
ELDP	Evangelical Lutheran Development Program
EPA	Extension Planning Area
FAO	Food and Agriculture Organization
FBO	Faith Based Organization
FGD	Focus Group Discussion
GAC	Group Action Committee
GDP	Gross Domestic Product
HIV	Hyper Immuno Virus
HIV/AIDS	Hyper Immuno Virus/Acquired Immuno Deficiency Syndrome
ICRISAT	International Crop Research Institute for Semi-Arid Tropics
IFDC	International Fertilizer Development Corporation
IFPRI	International Food Policy Research Institute
IITA	International Institute for Tropical Agriculture
I-LIFE	
MAC	Market Area Committee
NAC	National AIDS Commission
NASFAM	National Smallholder Farmers Association of Malawi
NGO	Non-governmental organization
OPV	Open Pollinated Varieties
	PLWHA      People Living with HIV/AIDS
RDP	Rural Development Project
SARRNET	Southern Africa Root Research Network
TIP	Target Input Program
UNAIDS	
UNFPA	United Nations Population Fund
UNICEF	United National Children Emergency Fund
WFP	World Food Program

## Executive Summary

### 1. About the Study

This report derives from a study that analysed the impacts of HIV/AIDS on inter- and intra-generational flows of information and local knowledge on relating to genetic resources utilised for food security and to identify new options to enhance access to agricultural knowledge and information by those affected by HIV/AIDS.

The report is divided into seven parts: introduction; methodology; socio-economic characteristics; food and cash crop production; seed management and knowledge and information transfer pathways; meso-level institutions in mitigating impacts of HIV/AIDS on crop production and seed knowledge transfer; the summary of research results and policy recommendations.

The introduction draws on existing literature to expose HIV/AIDS impacts on in Malawi, the importance of the research topic and the conceptual framework. It also outlines the aim and objectives of the study. The methodology section outlines the qualitative and quantitative approaches utilised in the collection of primary data. The sections on socio-economic characteristics, food and cash crop production, seed management and knowledge and information transfer pathways, meso-level institutions in mitigating impacts of HIV/AIDS on crop production and seed knowledge transfer present the results of the study. The last section presents a summary of key findings and their implication for policy.

### 2. Summary of Research Findings

- (i) *Socio-economic Characteristics of study populations*
- (ii) Men dominated household headship regardless of the inheritance systems. In patrilineal societies, most female-headed households belonged to widows unlike in matrilineal system where other types of single women headed half of such households. Hence more women in matrilineal societies were better placed to make investment decisions without interference from their husbands' lineage although the scale of limitation from the women's lineage was not established. Household heads in patrilineal societies were more educated than in the matrilineal systems.
- (iii) Proportions of child-headed households in Thyolo and Karonga were negligible. Instead, the extended family provided an important safety net for orphaned and vulnerable children.
- (iv) Higher proportions of households in Thyolo (matrilineal area) had a chronic illness at the time of the study compared to Karonga (patrilineal society). Relative to other household members, more mothers were chronically ill in Thyolo. This is bound to aggravate the vulnerability of households headed by women given that these were higher in this district than in Karonga.
- (v)

- (vi) Most HIV/AIDS-infected households were female-headed. They had less farm and non-farm incomes than affected households. Their average size in Karonga was about twice as large as for Thyolo.
- (vii) Land scarcity was an overarching constraint to production across the study sites. Rain-fed and irrigated land in Thyolo was less than in Karonga.

(ii) *Food and cash crop production*

- Maize was the predominant staple in Karonga and Thyolo districts. It was augmented by cassava and pigeonpea. Contrary to the expectation that pigeonpea was a major cash income earner in Thyolo, the small grain was a food crop to about 68% of the responding households. Reasonable proportions of HIV/AIDS-infected households grew pigeonpea as a cash crop. Pigeonpea was hence an important dual-purpose crop. Rice was a main cash income earner in Karonga while chilies were an important smallholder cash crop in Thyolo. Sorghum was rated by over fifty percent of households in Thyolo as an important cash crop used in opaque beer brewing. Higher proportions of HIV/AIDS-infected households in Thyolo grew tomatoes as a cash crop. This was followed by chilies and pigeonpea.
- Relatively high proportions of farmers still planted local varieties of maize as the main staple. Preference for crop varieties depended on the knowledge farmers had on key attributes particularly the potential for high yields, drought tolerance, taste and flavour, post-harvest processing characteristics and market acceptability. The Malawi government TIP programme also had added to the portfolio of varieties being grown through its consistent supply of farm inputs particularly seed.
- Poor access to product markets by some varieties (e.g. bluebonnet rice) had led to their low production while better preferred varieties with ready markets (e.g. Kilombelo rice) were proliferating. Farmers attributed the near-extinction of some crops and varieties to climate change particularly frequent droughts and shorter rainfall periods, low yields, late maturity, declining soil fertility, high cost of fertilizer, low market demand and susceptibility to diseases. The study did not establish impacts of HIV/AIDS on households' capability to continue growing certain crops and varieties and not others. More research is required particularly longitudinal monitoring of HIV/AIDS-infected households to discern such changes in crop diversity and the drivers of change.
- Men dominated decision-making on the types of crops and varieties to be grown by a household regardless of the type of inheritance system. However, higher proportions of women from HIV/AIDS-infected households made decisions on crops and varieties to be grown compared to those from HIV/AIDS-affected households. In households where both husband and wife were residing on the farm, higher proportions of wives in matrilineal societies made decisions on crops and varieties to be grown, unlike in patrilineal areas.

Hence lineage patterns, gender and the health status of a household had a profound effect on household investment decisions.

- Multi-stage” (whole-sample vs. sub-sample) analysis was found to be very important in the analysis of gender and of HIV/AIDS impacts as it revealed factors that would otherwise be implicit if only whole sample analysis was carried out.

**(iii) *Seed management and knowledge transfer pathways***

- Both formal and informal seed sources were utilised by farmers. Informal seed sources were more relied upon for food crops. These comprised seed retained from the previous season’s harvest, neighbours. Seed purchases, NGOs and the government TIP programme were the common formal seed sources. NASAFAM was the most important provider of seed for rice and chilies, the major cash crops. This was part of NASAFAM’s commodity-specific extension.
- Women dominated the seed selection process in matrilineal societies and men in the patrilineal system. However women in HIV/AIDS-infected households dominated this activity.
- Farmers knew the attributes to look for in seed selection: size, appearance and quality including freeness from pests and diseases.
- Seed preservation and storage utilised a combination of traditional and modern methods. Although men dominated decision-making on what crops and varieties to be produced for food and cash income, higher proportions of women held the responsibility for seed preservation and storage. More women than men were responsible for seed storage in HIV/AIDS-infected households.
- Agricultural extension and neighbours were the major intra-generational sources of information and knowledge on seed selection. Extension services were useful in the introduction of new and improved crops and modern varieties. Inter-generational knowledge sources consisted mainly of parents and grandparents even in the case of HIV/AIDS-infected households. These prevailed mainly in food crop production. The findings suggest a probable distinct difference between knowledge sources on traditional and modern crops and varieties. For traditional crops such as maize, informal sources of knowledge were more important. For cash crops and new crops, formal sources of knowledge were more relied upon. Hence combinations of formal (extension) and informal (parents and neighbours) sources of knowledge were deemed important. This suggests a learning curve whereby formal sources dominate the early stages of introduction of a new crop or promotion of an improved variety but during later stages, the informal sources take over as some farmers within the society become experts on such crops. This is an empirical issue that requires longitudinal tracking to establish the facts.
- Parents including grandparents were major inter-generational sources of seed knowledge and information. Seed knowledge and information was passed onto

children in three common ways: involvement of children in seed management activities; parents teaching their children; and by children learning about seed management in school. Schools played a minimal role. These pathways were similar to those in households infected by HIV/AIDS. Since inter-generational knowledge transfer was to the largest extent based on interaction between parents and children, the greatest challenge lies in the fact that if parents are chronically ill or succumb to early deaths due to HIV/AIDS, children will increasingly lack the older generation that should teach them by doing.

- Over 80% of households did not report knowledge transfer to children by the chronically ill members. In the few cases where the converse was true, both the girl and boy child was targeted. Knowledge was transferred to more girl children in the matrilineal societies while the converse was the case in patrilineal societies. Cases of knowledge transfer to grandchildren show the important role of the elderly in transmission of knowledge mainly to orphans.

**(iv) *Institutions and seed knowledge transfer***

- Meso-level institutions intervening in situations of HIV/AIDS run a broad portfolio of activities ranging from food security, relief and nutrition through natural resources management, income generation, technology development to mitigating impacts of HIV/AIDS and gender inclusiveness. Both research and development are addressed.
- Over 70% of study households belonged to farmers' clubs. However over 80% of study households reported not to have gained seed knowledge from these organisations. Few benefiting households reported to have gained some knowledge on seed selection and management.
- Meso-level institutions focused on the transfer of information and knowledge within generations using formal and farmer-to-farmer extension. Subject matter areas were promotion of crop varieties and the distribution of farm inputs such as seed and fertiliser. Clarity is lacking on how the potential of these organisations could be harnessed for inter-generational seed knowledge transfer.

**3. Policy recommendations**

- (ii)** Since men dominated household headship in spite of the inheritance structure, and because of high proportions of households headed by women especially in matrilineal societies, gender mainstreaming in intervening programmes is recommended. This is further supported by the fact that knowledge transfer pathways favoured the girl child in matrilineal societies and the boy child in patrilineal areas. It is further supported by the fact that women headed most households infected by HIV/AIDS. They made most investment decisions regarding crops and varieties to be grown. And they held the greater responsibility for seed selection, preservation and storage.

- HIV/AIDS-infected households had the lowest far and non-farm incomes. They also had lower land holding sizes and relatively larger household sizes. Inter-generational seed knowledge transfer in these households depended a lot on interaction between parents and children. The greatest challenge for these households lies in the fact that if parents are chronically ill or succumb to early deaths due to HIV/AIDS, children will increasingly lack the older generation that should teach them by doing. These households therefore form a special category of vulnerability that requires specific targeting by research and development.
  
- (iii) Households infected by HIV/AIDS were diversifying their crops beyond the usual chilies, rice and pigeonpea into horticulture. This is an important entry point for the promotion of nutrition gardens for such vulnerable households. Promotion of such technologies ought to be accompanied by transfer of germplasm and seed knowledge.
  - The study did not establish impacts of HIV/AIDS on households' capability to continue growing certain crops and varieties and not others. More research is required particularly the longitudinal monitoring of HIV/AIDS-infected households to discern such changes in crop diversity and the drivers of change so as to inform policy accordingly.
  - Combinations of formal (extension) and informal (parents and neighbours) sources of seed knowledge were utilised to varying extents depending on whether or not the crop or variety in question was modern. This suggests a learning curve whereby formal sources dominate the early stages of introduction of a new crop or promotion of a modern variety but during later stages, the informal sources take over as some farmers within the society become experts on such crops. This is an empirical issue that requires longitudinal tracking to establish the facts as an input into technology targeting processes.
  
- (iv) The important roles played by grandparents in the transfer of seed knowledge and information highlights the significance of the elderly in bridging the gap left by the “missing” generation of prime-age adults due to HIV/AIDS. This is supported by the fact that over 80% of the chronically ill did not transfer seed knowledge to their children. More research is required to establish how best this category of elderly households can be targeted within seed systems.
  
- (v) Although there were many meso-level organisations intervening in situations of HIV/AIDS, well four fifths of study households reported not to have gained seed knowledge from these organisations. For those that did, they only benefited from intra-generational knowledge transfer mechanisms used by these organisations. But the increasing numbers of orphans taken care of by the elderly and other extended family relations require inter-generational methods. This is supported by the fact that proportions of child-headed households were negligible. The potential of these organisations ought to be harnessed for inter-generational seed knowledge transfer.

# **1. Introduction**

## **1.1 Impacts of HIV/AIDS in Malawi**

Proportions of HIV-infections and AIDS-related deaths have reached pandemic proportions in some Sub-Saharan Africa countries. According to United Nations and World Health Organizations AIDS has become the world's biggest fatal disease and largest cause of death in Africa (Willis 2002). HIV/AIDS will exacerbate poverty and retard economic development including the attainment of the Millennium Development Goals. Impacts on human capital are alarming: increasing AIDS-related prime age deaths; soaring ratios of dependants to working-age populations and worsening demographic transitions.

For the seven African countries with adult HIV prevalence rates of at least 20 percent national population is projected to be 35 percent lower by 2025 than it would have been in the absence of AIDS. By 2020-2025, life expectancy in these countries will be 29 years less than it would be without AIDS, a 41 percent difference (UNFPA, 2004). There is also growing evidence that per capita economic growth will be diminishing as a result of increasing dependency ratios, increasing burdens on health systems, constrained investment in productivity and reduced labour forces. Malawi is one of the African countries similarly although not equally affected by HIV/AIDS.

Malawi is a small land-locked country in southeastern Africa with a population of 12 million of which about 85 percent lives in rural areas where agriculture is the main economic activity. Despite the implementation of Structural Adjustment Programs since 1981, Malawi remains one of the poorest countries in the world with the level of poverty having worsened in the past 10 years (UN Development Index, 2004). About 65 percent of the population lives below the poverty line; 75% of which are women; 40 percent of the population survives on an income of less than US\$0.30 per day. Food insecurity is another livelihood stressor for the country. In 2002 alone, 30% of the population required relief assistance (UNAIDS 2004). Impacts of HIV/AIDS have worsened this situation.

According to UNAIDS (2004), 14.2% of the country's population is infected by HIV (HIV infection ranged from 11.3 % to 17.7%). By the year 2003 a total of 810,000 productive adults aged 15-49 years were living with HIV and these included 460,000 women. The country experienced 83,000 AIDS deaths in the year 2003 alone. HIV/AIDS accounts for 40 percent of all in-patients in the hospitals and is the leading cause of death in the productive age group of 20 to 49 years (Malawi Government, 2003). For instance in Mulanje and Thyolo district hospitals, HIV/AIDS accounts for over 70 percent of all hospital admissions. Mortality due to HIV/AIDS stands at 20 percent largely attributed to co-infection with HIV/AIDS related diseases.

Life expectancy at birth declined from 52 years in the 1990s to an average 43 years in 2002 (Malawi Government, 2000). Without HIV/AIDS, life expectancy was projected at 57.4 years by 2010 (World Bank, 1996). Taking HIV/AIDS into account, the estimated life expectancy by 2010 is 48.81 years, a variance of 8.6 years.

A majority of Malawians like in most other Sub Saharan countries derive their livelihood from the agricultural sector, the impact of HIV/AIDS on agriculture has been unparalleled. It affects rural livelihoods in general and food security in particular. In the 25 most affected African countries, AIDS has killed seven million agricultural workers since 1985; and it could kill 16 million more within the next 20 years (FAO, 2000). For example in Malawi, Makandi Tea Estate experienced a six-fold increase in mortality among its employees between 1991 and 1995 up from 4 per 1000 employees to 23 per 1000 employees. Annual costs of HIV/AIDS to this company were 6 percent of annual profit (Jones, 1996). Other impacts on agriculture include yield decreases, labour reductions due to sickness, deaths and time re-allocations to care for the sick and participate in funerals; weakening agricultural extension services; poor or non participation in credit schemes; increasing households headed by women and the elderly and the young; high dependency ratios; and poverty (Bota et al. 2001; Kadzamira et al. 2001; Ngwira, 2001; Kachigamba 1998; Palamuleni et al, 2003; Shah et al, 2001; Phiri *et al*, 2003). Loss of knowledge leads to a suite of changes in affected households' ability to use land and other resources. Loevinsohn and Gillespie (2003) support this occurrence when they report that AIDS orphans may not have acquired enough skills to perform some key agriculture and economic activities before their parents died thereby leading to increased livelihood insecurity. The multiplicity of gender roles and responsibilities of women at the household level as mothers, household keepers, care givers; their farm responsibilities as smallholder producers together with their community level obligations are negatively affected by HIV/AIDS. Consequently their contribution to food security and production for the market are interfered with. A chronically ill parent is physically weak to cultivate the land while the loss of one partner's special skills leads to a fall in food production (FAO, 1995).

In Malawi, HIV/AIDS has led to a decline in crop yields and erosion of household's food security. Phiri (2003) reported that in Zomba district, HIV/AIDS affected households achieved lower maize production than non-affected ones and consequently had the overall effect of lowering agricultural productivity index of their communities. About 92 percent of the affected households are food insecure in this way; the percentage for non-affected households was much lower at 47.3 percent

Increasingly, the problem of orphanhood is attracting attention at the household, community, national and international levels. The traditionally dependable extended family support system is stressed. The Ministry of Gender, Youth and Social Welfare in Malawi reported that, over half a million of orphans had been identified and assisted by the year 2002; and the Ministry also registered an increase in the number of child workers. Children with no means of support sell labour to earn a living as they consider this a better option compared to begging and street living. The World Bank (1999) projects that the orphan crisis in Malawi will stretch and overburden the country's major social safety nets for the next two decades.

Orphan-headed or child headed households are an emerging household type that pose unique development challenges. The State of the World's Children Report (UNICEF, 2005) estimates that in 2003 there were over 500,000 children aged 0 – 17 years who were orphaned by AIDS in Malawi. Children whose parents have died suffer from both distress and economic hardships (Williamson and Donahue, 2001). Besides increasing childhood malnutrition, a prime age adult death in a house is likely to

reduce school enrolment or induce early dropouts from schools. Children withdraw from school to work outside the home to help with chores and farming, or care for an ailing family member. Children who have lost one or more parents are likely to have lower enrolment rates than those whose parents are alive. The most affected is the girl child who runs the risk of being exploited because of the need to earn a living. Studies in Central African Republic showed enrolment rates of over 60 percent for children with parents against 39 percent for those with both parents dead (World Bank, 1997).

Most research in Malawi has concentrated on the general impacts of HIV/AIDS on livelihoods and agriculture as earlier explained but not on specific technological issues such as plant genetic materials; yet seed is the foundation of all farming. This study recognised the fact that HIV/AIDS induces premature deaths of adult farmers who leave behind young orphans. It also acknowledged earlier research findings that this in turn prevents the effective transfer of farming skills and agricultural knowledge from parents to children thereby leading to the erosion of local agricultural knowledge over time; and resulting in generations of young farmers who lack even basic farming skills. According to Loevinsohn and Gillespie (2003) the breakdown of agricultural systems to provide young adults with adequate livelihood opportunities is often behind their abandoning the agricultural sector. This is so because such youngsters may not be well equipped to deal with the diversity of agricultural constraints such as land tenure restrictions; prohibitive local practices and customs relating to inheritance; and the overall extent of resource depletion and employment opportunities. This crosscutting nature of HIV/AIDS impacts makes this research very important.

## **1.2 Importance of the Research Topic**

This study is an assessment of HIV/AIDS impacts on inter- and intra-generational information and knowledge flows among smallholder farmers in Malawi.

The capacity to achieve household food security in rural Malawi is underpinned by smallholder farmers' ability to make decisions about what crops to grow, which inputs to use and how to use them (husbandry issues). This depends on experience, access to resources and the availability of information that enables farmers to make informed choices. At household and community level, one key factor in food security is local knowledge on seeds, seed and management and access to seed which in turn contributes to food security.

Tripp (2000) identified four sources of seed demand. A household will demand seed because first it is in an emergency resulting from drought, flood and civil war. Second, demand can originate from poverty whereby a household either eats or sells their seed. Third, for hybrids, demand is an issue of quality assurance and finally, a household can demand seed in order to change variety. Smallholder farmers traditionally keep their own seed, which is carefully selected at harvest time. There is also sharing of seed among farmers or selling seed for labor. Tripp (2001) reported that smallholder farmers take care of their seed provision. Provision in this case refers to a collection of activities required to develop crop varieties, produce seed (seed multiplication, conditioning and storage), quality control and marketing.

Smallholder farmers the world over have demonstrated a capacity to have intimate knowledge about the varieties and their attributes. Bruschi et al. (1981) found that an average farmer in Peru could name about 35 types of potatoes and that the knowledge varied by farmers. Boster (1986) found that most knowledge of cassava varieties was spread among women as compared to men. In Malawi, Ferguson et al. (1991) noted that although farmers grew a mixed variety of beans, all the beans grown were carefully selected because of their attributes such as fast cooking, good taste, and good marketability. Ferguson also found out that in cash crop growing area such as central Malawi, beans were considered a woman's crop such that women had more knowledge about the crop/varieties than men were. Thus women farmers were seen to be managers of a diverse portfolio of bean varieties while men concentrated on the cash crop, tobacco.

The scenarios described above are the knowledge set that HIV/AIDS is likely to disrupt. Gender division on roles and responsibilities is such that women are caregivers and the resulting labour and time constraints sometimes cause them not to cultivate desirable varieties intensively. In the absence of an adult farmer (e.g. due to illness or death), a household will not effectively make decisions on what crops/varieties it should grow, or how to select seed, how to store and even how to cultivate among other decisions.

Knowledge on seed (including management issues) is traditionally transmitted by information flows both between and within generations (e.g. from mother to daughter, and between neighbours). Traditionally, the rural community has tended to pass on technologies between and within generations. Due to formal extension services especially by the public sector and NGOs, technologies have infiltrated rural areas through a select group of farmers sometimes termed the gatekeepers. These are farmers usually belonging to a farmers club who first take up the technology and later extend the technology to the wider community. Experience has shown that access to such technology determines level of food security of a household.

Agriculture has hence evolved to the extent that young adults would have acquired enough knowledge on seed and husbandry practices by the time they start their independent lives away from their parents. The level of knowledge an individual acquires during youth thus determines the productivity of their households later in life

The flow of information and knowledge between generations is increasingly being disrupted by the HIV/AIDS pandemic. HIV/AIDS is unique because it strikes the educated and skilled as well as the uneducated (USAID, 1993; Dallabetta and Miotti, 1994). It is an increasing concern that parents die before they pass on enough knowledge to their children; or they become too sick to effectively impart knowledge and skills. This study is aimed at investigating the extent to which HIV/AIDS has disrupted the process of agricultural knowledge transfer between and within generations. In addition, the HIV/AIDS crisis has brought about differential levels of vulnerability between males and females; the young and the old. Because of desperation and a lack of farm knowledge and skills, orphans often engage in risky livelihood activities like prostitution (Palamuleni et al. 2003). Women are more vulnerable than men to engage in such unsustainable livelihood activities after death of a husband or parents (Kambewa et al. 2002).

### 1.3 Conceptual Framework

A framework by Barnett and Whiteside (2002) on the impacts and generic responses to HIV/AIDS epidemic recognized four levels of impacts namely microbiological, micro-environment, meso-environment and macro-environment. As far as the research question for this study was that the likely impacts of HIV/AIDS are addressed in the microenvironment and meso-environment. Specifically, HIV/AIDS has the following impacts on a household: assets, labor, attitude, terms of trade and entitlement under the microenvironment. The impacts of HIV/AIDS on farming systems and community institutions are most felt within the meso-environment. Thus as far as flow of agricultural information is concerned, these two types of environment are likely to be the most critical.

Generic responses to these impacts have been through the provision of orphan care and feeding, enhancing understanding, improving food security and livelihood options and strengthening local institutions. Institutional breakdown under macro-environment is another impact on information flows since extended families and communities can also carry out the function of transferring information in the absence of parents. Hence there is a need to have local supportive institutions to fill in traditional structures.

The study will therefore aim at identifying the impacts of HIV/AIDS on the information flows on seed related issues in the communities and examine the responses that communities use to mitigate HIV/AIDS on infected and affected households. It is hypothesized that level of knowledge of a household is a function of a farming system, community institutions, gender characteristics and situations of risk. These factors tend to be of medium impact. The study will also investigate the extent to which information flows help develop resilience in situations of impacts of HIV/AIDS. In this case we are saying if the breakdown in information flows can be resuscitated, vulnerable households such as those headed by children and women would not be as worse off as they presently are. Hence what alternative pathways can be used when the traditional knowledge pathways become ineffective?

For each environment, we want to determine the knowledge and information pathways by different types of households. Also, we want to determine how effective the markets are. How are the various or different types of households participating in the markets? Can we use the different levels of participation to explain the information and knowledge pathways?

What are the impacts of HIV/AIDS on food security, on knowledge and information pathways and access to markets? What has been the response to the various challenges? How can the households be made more resilient to the challenges, i.e. impact of HIV/AIDS on food security, knowledge systems and access to markets? What value can be added to the functioning of the institutions that are intervening in food security, markets and technology transfer?

## 1.4 Research Aim, Assumptions and Objectives

### *Aim*

The aim of the project was to understand the impact of HIV/AIDS on the inter- and intra-generational flows of information and local knowledge relating to genetic resources utilized for food security; and to identify new options to enhance access to agricultural knowledge and information by those affected by HIV/AIDS.

### *Assumptions*

The study was guided by several assumptions:

- In Malawi inter- and intra-generational knowledge transfer is contextual depending on the type of lineage or inheritance system. In matrilineal societies where households practice matrilineal residence, females have higher control over land and more influence on the children than do males. Conversely in patrilineal societies where patrilineal residence is practiced, males control land and have more influence on children than do the females. As such, the study sought to find out whether one lineage system was likely to result in more efficient information and knowledge transfer than the other.
- Knowledge on seed for cash crops and food crops was bound to exhibit gender differentials with women having more knowledge about genetic resources pertaining to food crops and men having more knowledge about the cash crops. The study recognized that there are deep inherent gender differences relating to the type of lineage and inheritance system
- Differences exist on seed knowledge<sup>4</sup> transfers for cash crops and for food crops.

### *Objectives*

- (i) Assess the existing situation and recent trends in the study areas regarding sources of, access to, and transmission of information and knowledge on seeds and seed management among smallholder farmers. The assessment was to be guided by the following research questions:
  - How do gender differences influence or are influenced by formal and informal systems of transmitting seed knowledge and information within and between generations?
  - How do child-headed households compare with adult headed households in terms of influencing or being influenced by formal and informal systems of transmitting seed knowledge and information within and between generations?
  - What are the gaps in and obstacles to accessing and transmitting seed knowledge and information by gender and by age of household head (i.e. child and adult headed households)?
- (ii) Assess the likely impact of HIV/AIDS on the flow of information regarding the conservation and use of genetic resources utilized for food security. Main research question: Do households affected by HIV/AIDS (e.g. child-headed

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<sup>4</sup> Seed knowledge refers to knowledge on the genetic potential of varieties and seed management issues including selection, sorting, storage and planting.

households) manage their crops and/or seeds differently from those not affected e.g. adult-headed households?

- (iii) Identify ways to strengthen dialogue between local knowledge, modern technologies and agricultural services to improve food security in areas affected by HIV/AIDS. Particular attention to be given to the potential role of markets and small-scale traders in allowing those affected by HIV/AIDS to enhance their access to agricultural knowledge and information.

## **2. Methodology**

### **2.1 Study Design**

The study was comparative between Thyolo district with a matrilineal inheritance system and Karonga district with a patrilineal inheritance system. It was also comparative between cash crop and food crop producers.

Thyolo district is one of the rural areas in Malawi with high HIV/AIDS prevalence. The 2003 HIV sentinel surveillance report indicated that HIV prevalence among pregnant women was 23.2 percent (Malawi Government, 2003). The district is under the Blantyre Shire Highland RDP. Tea is the major cash crop in Thyolo but is mainly grown by the estates with minimal smallholder production under the Smallholder Tea Authority. Increasingly, chilies are becoming an important cash crop especially with the support of NASFAM. The EPAs chosen for the study were Matapwata, Thyolo Central and Khonjeni EPAs. Thyolo district also has a high number of NGOs working on HIV/AIDS related programs.

Karonga is a lakeshore district with rice production as the major economic activity. It is also a district, which is highly influenced by the commerce as it lies along the main road connecting Malawi and Tanzania (sometimes a reason cited for the HIV/AIDS prevalence). The HIV prevalence among pregnant women was estimated at 20.5 percent (Malawi Government, 2003). This study was conducted in Karonga North, which comprises Kaporo North and Kaporo South EPAs.

A pilot survey was conducted in Dzaone EPA in Zomba district prior to the formal survey to test research instruments as part of training for enumerators.

### **2.2 Sampling Procedure**

A multi-stage sampling procedure was utilised in the study. The first basis for the choice of study sites was the high incidence of HIV prevalence, which in turn influenced the spatial and administrative selection of the locations. Two Agricultural Development Divisions (ADD)<sup>5</sup> namely Blantyre ADD and Karonga ADD were selected. In Blantyre ADD, three Extension Planning Areas (EPAs) were purposively selected from Thyolo district. These were Thyolo Central, Matapwata and Khonjeni EPAs. In Karonga ADD, two EPAs from Karonga district were studied; and these

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<sup>5</sup> Malawi is divided into eight ADDs with each ADD divided into Rural Development Projects (RDP) which number 28. RDPs are divided into EPAs which constitute the smallest unit of planning.

were Kaporo North and Kaporo South. Both Thyolo and Karonga districts had high HIV/AIDS infection rates. Relative to the national HIV prevalence rate of 14.2% (UNAIDS 2004), HIV prevalence in Karonga district was 20.5% and in Thyolo it was 23.2% by the year 2004 (Rep of Malawi –NAC Sentinel estimates, 2003). The high incidence of HIV/AIDS in Karonga has been attributed partly to the district’s close proximity to the border with Tanzania. Consequently trans-boarder trade and nearness to the main highway connecting the two countries, fuels the spread of the virus. In Thyolo district, high casual paid labour force in the nearby tea estates contributed to the high HIV prevalence. This in turn to had led to increasing risky sexual behaviour and further spread of the virus.

The second criterion for choice of study sites was sociological drawing from the prevailing societal inheritance systems. Thyolo practised a matrilineal inheritance pattern while in Karonga it was patrilineal. This way, comparisons could be drawn between the two groups and recommendations specific to each made. The third selection criterion was based on production of food and cash crops as major enterprises. In addition to tea Thyolo was known for smallholder production and marketing of bird’s eye chilies and pigeonpea as cash crops. The National Smallholder Farmers’ Association of Malawi (NASFAM) backstopped these. In Karonga, NASFAM promoted smallholder production and marketing of rain-fed rice. Generally, the presence of NASFAM was used as an indicator of smallholder cash crop production in each study district. Lastly, partnerships between ICRISAT and NASFAM played a role in study site selection since this would ensure that the findings of the study were put to immediate use by the potential beneficiaries. Both organisations had research and development activities in each of the study areas. In Thyolo, ICRISAT was scaling out improved pigeon pea varieties coupled with proper crop management practices. Thyolo and Karonga districts also had many NGOs implementing food security and HIV/AIDS related programs.

Sampling of respondents took place at EPA level. Two types of respondents were identified: NASFAM-affiliated farmers involved in cash crop production and non-NASFAM farmers involved in food crop production. Choice of cash crop producers followed the NASFAM operating structure. In this structure, individual farmers constituted a club; several clubs together formed a Group Action Committee (GAC); and several GACs constituted an EPA for NASFAM. A summary of clubs from which the responding households were sampled is given in Table 1. Listings of NASFAM club members formed the sampling frames from which responding households were randomly selected.

<b>ADDs</b>	<b>RDPs</b>	<b>Total GACs/MACs</b>	<b>Total NASFAM Clubs</b>	<b>Clubs Represented</b>	<b>Focus Group Discussions</b>
Karonga	Kaporo South	8	31	31	3
	Kaporo North	9	35	35	
Thyolo	Matapwata	3	10	10	6
	Thyolo Central	1	11	11	
	Khonjeni	4	23	6	

Sampling of non-NASFAM households, which also were purposively selected for food crop production, followed a different procedure from that of cash crop producers. Because household listings for this type of farmers were not available, community meetings were organized in the study GACs/MACs. During these meetings participants in Focus Group discussions (FGDs) were identified. These consisted of men and women involved in food and cash crop production and other types of household heads including widows, orphans, the elderly; and community leaders as well. During these meetings, farmers who were not involved in cash crop production were randomly identified to participate in household interviews later on. These farmers did not take part in FGDs.

### **2.3 Data Collection Process**

The data collection process comprised two primary phases. The first phase was characterized by four distinct activities.

First preliminary interviews were carried out with key informants drawn from the communities, NGOs, CBOs and FBOs implementing activities in the study areas. The sub-objective was to establish the magnitude of households vulnerable to HIV/AIDS; identify key livelihood constraints faced by these households; and get a feel of their food security status, their access to markets and market information and how these impacted on their well being. The second related objective was to identify the impacts of HIV/AIDS on agricultural production and on seed knowledge in particular. These interviews also helped find out what organizations were working with the communities on issues pertaining to agriculture and commercialization in general and to HIV/AIDS in particular.

The second component of the study engaged community members in a qualitative assessment of their livelihoods with a focus on food crop production and marketing, HIV/AIDS and information/knowledge on seed and seed management. This activity also sought to qualitatively establish the scale of households vulnerable to HIV/AIDS; these included those headed by widows, orphans and the elderly and households caring for the terminally ill. These were categorized as HIV/AIDS-infected households. The other group of households was those affected by HIV/AIDS as opposed to the infected ones. Households that had not lost the main breadwinner to death, those in which both husband and wife were still alive and strong enough to work and those that were not directly caring for a terminally ill member constituted this category. A cross-section of respondents participated in FGDs. Widows, orphans heading households, households taking care of orphans, households headed by the elderly and those caring for the terminally ill. Each FGD involved at least 15 members with representation from each of the vulnerable categories. Affected households constituted another set of FGDs.

The third activity was a formal survey in which structured and semi-structured questionnaire were administered to sample households. The sample size was increased from 90 households at each site to a total of 307 in Thyolo and 230 in Karonga. In Karonga, the sample size comprised 185 male-headed households, 42 female-headed households and 3 child-headed households. In Thyolo, these

proportions were 210, 95 and 2. Overall, 161 households in Thyolo (52 percent) and 209 in Karonga (92 percent) were involved in cash crop production.

The fourth activity was the assessment of interventions by organizations working on HIV/AIDS within Malawi. An institutional analysis was conducted among stakeholders involved in agriculture and HIV/AIDS programs. Selected organizations comprising of NGOs especially members of C-SAFE/I-LIFE consortium (since these were involved in relief and other development activities including food production, marketing, input supply and mitigating impacts of HIV/AIDS on livelihoods) were targeted and interviewed. These were NGOs (American Red Cross, Africare, European Union, WAC, Care International, Emmanuel International, World Vision Malawi and CRS); United Nations organizations (FAO, WFP, IFDC, UNICEF); International Agricultural research institutes (ICRISAT, CIAT, IITA); National institutions (NASFAM, NAC and Ministry of Agriculture) and the donor community (DFID). Their involvement in germplasm and knowledge (variety and attributes e.g. taste, early maturing or not, drought tolerance) transfer on seed was assessed using a semi-structured questionnaire.

The guiding assumption was that most NGOs transferred germplasm whose attributes they did not even know; as such chances of promoting germplasm unsuitable to local agro-climatic conditions were very high. The institutional analysis also sought to understand the extent to which such programs targeted child headed households and HIV/AIDS infected households. Input was sought from these organizations on how research can best generate information useful in decision-making so as to target specific agricultural programs that improve the well being of vulnerable households including those headed by orphans. A further analysis of these groups was conducted during the main field work and was aimed at establishing the extent to which the organizations were addressing issues of intergenerational or intra-generational transfer of knowledge in agriculture in general and on seed knowledge in particular.

Data Analysis was both qualitative and quantitative. Content analysis was carried out on data collected through the FGD, to compile emerging issues along themes. Some data such as importance of problems and severity of the problems to particular groups were prioritized so as to reflect the urgency of the problem at hand. In each EPA, the PRA exercise established an overall profile of the local socio-economy as well as a historical overview of the demographic and health profiles. A general overview of seed information and knowledge flows at community level was obtained, including gender differences and impediments to seed knowledge and information flows. Temporal changes in seed types used, the mechanisms for obtaining seed and techniques used for selecting and storing of seeds was elucidated through an understanding of the cyclical history of natural disasters and other crises, including changes associated with HIV/AIDS. Where necessary, verbatim from group has been used. Sample survey data was quantitatively analyzed using SPSS version 11 computer software.

A verification workshop was conducted in Thyolo at district level during which research findings were fed back to study communities for verification and to ensure that the communities involved in the research were also fully involved in generating recommendations. Community representatives, ADD staff (including extension agents), input suppliers and petty traders, NGOs, schoolteachers, health workers and

other key stakeholders were invited. The involvement of other stakeholders was aimed at sensitizing them on how their programs could contribute to the prevention of HIV and mitigation of impacts of HIV/AIDS on livelihoods of smallholder farmers. Preliminary results were presented, and options for improving information flow to and among farmers were to be explored. The community verification workshop formed part of the monitoring and evaluation of the research itself.

A national level workshop was organized to present the findings and recommendations of the study to a cross-section of stakeholders and potential partners nationally. Feedback from the workshop was incorporated in the final research report recommendations. This report was to eventually be shared widely to help inform decision-making by those involved in mitigating impacts of HIV/AIDS on smallholder production and livelihoods in Malawi.

#### **2.4 Ethical Issues and Human Subjects Considerations**

This study focused on a sensitive subject, HIV/AIDS, hence considerations were made regarding the rights of the respondents. Problems were not expected with focus group discussions. However, the individual interviews and specifically interviews with child headed households were to be tackled with caution. Irrespective of a households' status, all respondents were informed that they were free to participate in the survey and that even during the interview period, if they were not comfortable with a question, they might not answer it. For the child headed households, prior consent was sought from the chief at village level and nearest guardian at household level before any interview was conducted. Key to this process was prior sensitization of the opinion leaders, and institutions working in the area.

Involving service providers, especially those NGOs, FBOs, and CBOs that provide assistance to HIV/AIDS affected and infected households, also further facilitated this process. These existed at village level and at district level. Hence during fieldwork, there was a deliberate attempt to have some officials from the organizations in the villages. Apart from offering them an opportunity to see what is on the ground, the exercise also assisted the villagers to directly make contacts with the service providers in case there was a need for medical attention or food relief to the affected households.

### 3. Socio-economic Characteristics

#### 3.1 Household Demographic Characteristics

As earlier discussed Thyolo district is basically a matrilineal society while Karonga is predominantly patrilineal. Table 2 shows some demographic characteristics of the sample households.

	Karonga		Thyolo	
	Count		Count	
Male-headed households	185	80.4%	210	68.6
Female-headed households	41	17.9%	94	30.7
Child-headed households	3	1.3%	2	0.7
Mean Household size	230	6.1	307	5.4
Mean age of household head in years	189	41.3 (13.28)	214	50.9 (14.67)
Mean years of school of household head	201	8.1 (3.17)	234	3.50 (3.23)
Mean years of school of male household head	162	8.4 (3.12)	113	4.2 (3.12)
Mean years of school of female household head	36	6.6 (2.94)	94	2.3 (2.97)

Figures in parenthesis are standard deviations

Men dominated household headship in both study locations regardless of the type of inheritance system. Close to 80% of households interviewed in Karonga and 69% in Thyolo were male-headed. Female-headed households accounted for about 31% of study households in Thyolo and 18% in Karonga. This is a reflection of cultural differences between the two districts. Because of the patrilineal inheritance system, wife inheritance is usually more common in Karonga than in Thyolo. Thus when a husband dies in Karonga, the brother inherits the wife, the children and property; whereas in Thyolo, the wife remains at her parents home and is not obliged by custom to marry the deceased husband's brother. As such, more widows are bound to be present in the latter than in the former district. The other reason was AIDS-related. Further analysis showed that a majority of female-headed households in Karonga were as a result of the death of a husband (87.5%); the rest were divorced and the rest never married. In Thyolo 50 percent of the female-headed households were widows and the other 50 percent were mainly divorcees and other single women.

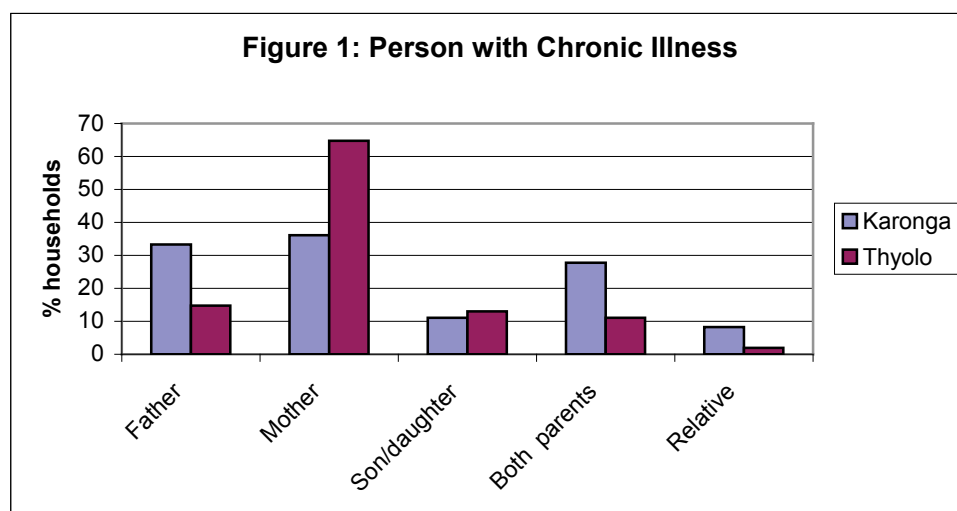
The mean age of household heads in Karonga (41.3 years old) was less than that in Thyolo (50.9 years old). These findings are consistent with the findings of the 1998 National Population Census, which indicated that, overall the population in the north of Malawi where Karonga is located, was more youthful than that of the south. Mean household size for Karonga was 6.1 as compared to 5.4 in Thyolo. In both sites, cases of child headed households were very minimal: 1.3% in Karonga and less than 1% in Thyolo. The low incidence of child headed households is an indication of the

importance of the extended family as a social safety net in so far as orphan care is concerned. Household heads in Karonga spent more years in school (8.1) compared to a mean of 3.5 years in Thyolo. In both districts, women spent less years in school compared to men. In Thyolo the mean years of schooling for women household heads was 2.3 compared to 4.2 for men while in Karonga corresponding proportions were 8.4 and 6.6 respectively. This is bound to have serious implications for technology transfer approaches including those that distribute seed or facilitate farmer access to credit since farmers who are able to read and write have an advantage over the illiterate ones.

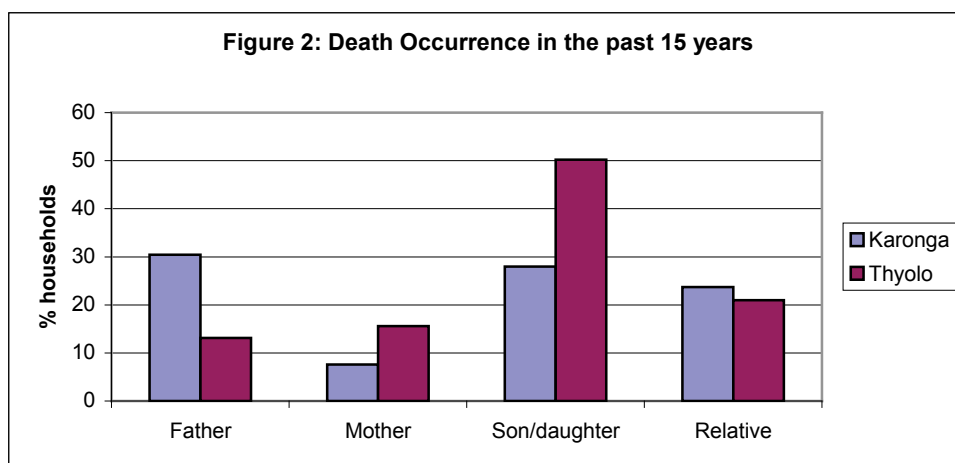
### 3.2 Households infected and affected by HIV/AIDS

The presences of a chronic illness at the time of the survey and a prime age death in the past twelve months were used as proxy indicators of HIV-infection in the household. Thus the study categorized households as “infected” and “affected”. Affected households did not have a chronically ill member at the time of the survey nor had they had a prime-age death in the past 12 months prior to the survey. This section discusses the demographic impacts of HIV/AIDS on study households. The rest of the impacts are discussed in later sections.

About 49% of study households in Karonga and 63.5% in Thyolo were classified as infected. About 68% of households in Karonga reported to have had a chronic illness in the previous 12 months. At the time of the study, 27.8% of households in Karonga and 16% in Thyolo reported a chronic illness. In addition, more mothers (65%) in Thyolo were ill compared to fathers or other family relations; the corresponding proportion for mothers was 36% in Karonga (Fig 1).



Since the recognition of HIV/AIDS cases in Malawi started about 15 years before the time of the study, the study sought to find out who had died since then (Figure 2). Generally more sons, daughters and fathers had died over this period. The fact that fewer mothers died indicates a presence of more widows than widowers and of more elderly persons than the younger prime-age generation; which in turn points to a possible presence of orphans and related constraints.



Most households took care of children aged below 18 years Table 3. About 87% of responses in Karonga and 90% in Thyolo indicated that a household took care of between one and three e such children.

**Table 3: Household distribution of children aged below 18 years  
(% of responses)**

No of children	Karonga		Thyolo	
	Count	%	Count	%
One	131	35.2	195	45.6
Two	122	32.8	123	28.7
Three	70	18.8	67	15.7
Four	29	8	33	7.7
Over four	20	5.4	10	23

Focus group discussions revealed that chronic illnesses deterred development work, as people concentrated their labour and time caring for the sick and children including orphans. The issue of orphans was confirmed by the fact that child-headed households were very minimal and instead, orphans were taken care of by relatives, especially the extended family. Because of the added responsibility of orphan care, most of the caregivers failed to attend to undertake farm activities due to time and labour limitations compounded by the lack of money to hire labour. One opinion leader stated that

“guardians are busy taking care of the sick, neglecting their gardens because of the demands, the sick person makes—(Thyolo, December, 2004)”.

The challenge posed by this went beyond the extended family and impacted on organisations providing such care as well. One of the groups interviewed had this to say about orphans

“...when a mother dies, children suffer a lot, because their father remarries another woman. The other woman will not give food to the orphans... Even orphans with their fathers alive get donations because once he (father) remarries he neglects his children from the deceased wife” (Women caretakers, Kaporo South, December, 2004)”.

The caregivers relied on their children or other relatives to assist them in agricultural activities, although not as efficiently as the owner could have done it. The challenge

lies in whether or not the sick and the caregivers were able to transfer seed knowledge to the younger generations given such constraints.

Table 4 shows some of the demographic characteristics of HIV/AIDS-infected and -affected households in Karonga and Thyolo. As in the overall sample, men dominated headship of households infected by HIV/AIDS. However, proportions of households headed by women were higher in HIV/AIDS-infected households compared to the affected households across both districts. Generally, female-headed households were more in Thyolo than in Karonga and proportions of households headed by children were negligibly low. 38.9 % of the male-headed households and 93% of the female-headed households in Karonga were HIV/AIDS-infected. In Thyolo these proportions were 54.8 % and 84% respectively. Heads of affected households in Karonga were younger with a mean age of 39.5 years, more educated with a mean years of schooling as 8.2 years and had larger mean household sizes (6.2). On the other hand, infected households were older with a mean age of 42.6 years, less educated (average years of schooling of 7.6) and had smaller household sizes of approximately 6. A similar trend was observed in Thyolo with age of infected household heads being 51.8 years and 43.1 years for affected households; average number of years in school of 4.1 versus 3.2 for affected households.

	<b>Karonga</b>				<b>Thyolo</b>			
	Infected HHs		Affected HHs		Infected HHs		Affected HHs	
	Count		Count		Count		Count	
Male-headed households (%)	72	63.7	113	97.4	115	59	95	85.6
Female-headed households (%)	38	33.6	3	2.6	79	40.5	15	13.5
Child-headed households (%)	3	2.7	0	0	1	0.5	1	0.9
Mean Household size	113	6.0 (2.56)	117	6.2 (2.34)	159	4.6 (1.63)	86	4.4 (1.56)
Mean age of household head in years	98	42.6 (13.27)	109	39.5 (13.45)	176	51.8 (14.68)	104	43.1 (15.19)
Mean years of school of household head	104	7.6 (3.62)	114	8.2 (2.93)	195	3.2 (3.2)	111	4.1 (3.36)

Figures in parenthesis are standard deviations

### **3.3 Land Scarcity and Crop Production**

Farming was the major occupation in Thyolo (96.1%) and Karonga (100%). These were augmented with small businesses and salaried/wage earning employment. Hence the main livelihood activities revolved around land owned by a household; and to a lesser extent on cash income earning activities. Landholding sizes were limiting although households in Karonga had more rain-fed and irrigated land compared to households in Thyolo (Table 5).

	Karonga		Thyolo	
	count	mean acres	count	mean acres
Rain fed land (all HH types)	219	2.0 (1.40)	292	1.79 (1.3)
Irrigated land (all HH types)	67	1.3 (0.69)	88	0.52 (0.26)
Rain fed land (Affected HHs)	111	2.04 (1.3)	109	1.83 (1.22)
Irrigated land (Affected HHs)	40	1.4 (0.7)	36	0.54 (0.31)
Rain fed land (Infected HHs)	108	2.00 (1.5)	183	1.76 (1.35)
Irrigated land (Infected HHs)	27	1.1 (0.6)	52	0.51 (0.23)

Figures in parenthesis are standard deviations;

Large-scale commercial tea estates were blamed for the small land holdings in Thyolo. During focus group discussions, people complained of the unfair distribution of land and the fact that they were not compensated upon losing their land to estates. One of the local chiefs in Thyolo lamented that the area faced frequent food shortages because land was scarce.

“Tea estates have grabbed all the land... *Thangata* (forced labour) pushed people to infertile and marginal land. The estates did not buy land from the people... no compensation was made... Because of this, we plant modern technologies to produce more crop ... local varieties require large pieces of land”. Chief Mmambo, November 2004.

Another farmer linked land scarcity to seed security by saying

“*tiidziwa bwanji mbeu pomwe malo olima tilibe*”

“How can we know the type of seed to grow, when we do not have land?”

At one FGD female headed households concurred with the chief, stating that

“...the land is small, therefore you cannot keep seed (from the harvest) ... you eat it all. How can children learn how to select seed and manage it if there is no seed in the first place?”

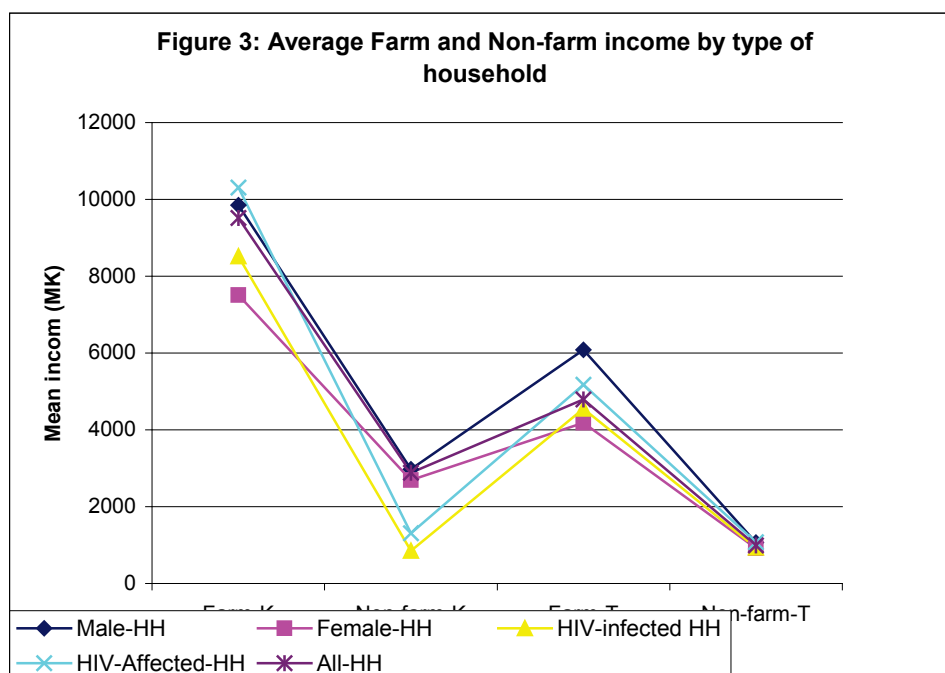
Land-related constraints were echoed in many places where the study was conducted. According to the qualitative findings, small landholding sizes limited crop production in both study areas.

### **3.4 Household incomes**

Overall the farm was the major source of household income in both Karonga and Thyolo. However, farm households in Karonga had higher farm and non-farm incomes than those in Thyolo as shown in Table 6 and Figure 3. Female-headed households had the lowest farm incomes in both study locations followed by households infected by HIV/AIDS. The latter type of households also had the lowest non-farm incomes in both districts; and like the rest of the households infected households depended greatly on farm income

Table 6: Mean Annual Farm and Non-farm Income* by Type of Household				
	Karonga		Thyolo	
	Count	Mean MK	Count	Mean MK
Farm income (All HH types)	184	9413.2 (6910.2)	213	4792 (4408)
Non-farm income (All HH types)	71	2884.5 (2508.6)	80	991 (685)
Farm income (Male-HH)	144	9852.3 (6977.2)	87	6085 (4899)
Non-farm income (Male-HH)	56	2971.4 (2474.6)	23	1065 (769)
Farm income (Female-HH)	36	7508.4 (5959)	72	4186 (3943)
Non-farm income (Female-HH)	14	2692.9 (2745.8)	35	919 (659)
Farm income (HIV-infected HH)	92	8514 (6741)	132	4554 (4670)
Non-farm income (HIV-infected HH)	20	852.5 (601)	49	937 (683)
Farm income (HIV-Affected HH)	92	10312 (6996.2)	81	5179 (3941)
Non-farm-income (HIV-Affected HH)	22	1307 (568.3)	31	1076 (692)

\* Income is in Malawi Kwacha. At the time of the study, MK107 = US\$1  
 Figures in parentheses are standard deviations



Farm-K=farm income in Karonga; Non-Farm-K=Non-farm income in Karonga; Farm-T=farm income in Thyolo  
 Non-Farm-T=Non-farm income in Thyolo

Higher incomes in Karonga may be attributed to several factors. First, Karonga had a more lucrative cash crop, Kilombero rice, with a better-established market, unlike in

Thyolo, where chilies were the important cash crop but not as widely produced and marketed. Second, households in Karonga participated in cross border trade with Tanzania as reported by the qualitative findings, thereby increasing their non-farm incomes. Third, there were relatively more commercial activities in Karonga than in Thyolo. Cassava and maize grown in Karonga were also highly commercial crops given that traders from Tanzania usually came to buy these produce from the district.

### **3.5 Summary of findings on the socio-economics of study households**

- (i) Types of smallholder farm households:** Generally men dominated household headship regardless in both matrilineal and patrilineal societies. A majority of female-headed households in Karonga were widows while in Thyolo widows headed half of this type of households. The rest of such household heads were divorcees or women that never married. This has implications for household decision-making. It appears that more women in Thyolo were better placed to make investment decisions without interference from their husbands' lineage. However the scale of limitation from the wives' lineage was not established. Proportions of child-headed households in Thyolo and Karonga were negligible. Instead, the extended family provided an important safety net for orphaned and vulnerable children.
- (ii) HIV/AIDS impacts and Gender:** Higher proportions of households in Thyolo had a chronic illness at the time of the study compared to Karonga. Relative to other household members, more mothers were chronically ill in Thyolo. This is bound to aggravate the vulnerability of households headed by women given that these were higher in this district than in Karonga. Women headed most HIV/AIDS-infected households in Karonga and Thyolo. Generally HIV/AIDS-infected households had lower farm and non-farm incomes than did their affected counterparts in both districts. Labour and time were constrained by the high levels of chronic illnesses and orphaned and vulnerable children to be taken care of. This made it difficult for infected households to diversify their livelihood strategies beyond the norm. for instance households headed by women and those infected by HIV/AIDS had the lowest farm and non-farm incomes. HIV/AIDS-infected households in Karonga were almost twice as large as those in Thyolo.
- (iii) Land ownership:** Land scarcity was an overarching constraint across the study sites. Rain-fed and irrigated land in Thyolo was less than in Karonga.
- (iv) Education:** Household heads in Thyolo were less educated than those in Karonga. In both districts, women spent less years in school compared to men.

## 4. Food and Cash Crop Production

### 4.1 Types of Food and Cash Crops Produced

Qualitative finding showed that smallholder farmers in both districts produced a mixture of crop types from a diversity of varieties (Table 7). Maize and cassava were major food crops in Karonga and Thyolo. Rice was a main cash crop for Karonga and chilies for Thyolo. Sometimes maize and cassava would be sold for small monies needed for household maintenance while rice complimented the major food crops. Pigeonpea and sorghum were food crops in Thyolo.

Crop	Varieties	
	Thyolo	Karonga
Maize	<ul style="list-style-type: none"> <li>- Hybrid MH18</li> <li>- Hybrid 41</li> <li>- Hybrid varieties were more commonly grown because they were early-maturing and also suitable for winter cropping</li> </ul>	<ul style="list-style-type: none"> <li>- Pannar seed 403, 407, 513</li> <li>- Local variety (<i>Chamakoro</i>)</li> <li>- <i>Kufula</i> (matures early but does not yield much)</li> </ul>
Cassava ( <i>Chinangwa</i> )	<ul style="list-style-type: none"> <li>- Bitter type (<i>Masangwi</i>), which has two colours: tubers with red/brown coat (<i>chofiira</i>) and tubers with white coat (<i>choyera</i>). These were most common.</li> <li>- Early-maturing variety (<i>Chithekele</i>), which produces tubers with a dark-red coat (<i>wofiira – wodelako</i>). Have short stems. "<i>athiana khamuwafwanyile–akazi simunapeze</i>" "you do not need a woman to cook, men can cook it because it takes too short a time to cook and one does not add a lot of water"</li> <li>- Research variety that takes up to 6 months (hybrid) to mature and produces tubers with a white coat (<i>choyera</i>). Tubers become fibrous if harvested late.</li> </ul>	<ul style="list-style-type: none"> <li>- <i>Kasantha</i>,</li> <li>- <i>joni</i>,</li> <li>- <i>gomani and mbundumale</i>: thieves target these varieties for sale in towns.</li> <li>- <i>chitimbwele, 2020-research, kasangani, Manyokola</i></li> <li>- Seed from Min. of Agric matures early and yields more</li> </ul>
Pigeonpeas ( <i>Nandolo</i> )	<ul style="list-style-type: none"> <li>- White variety (<i>Oyiera</i>)</li> <li>- Red variety (<i>Ofiira</i>)</li> </ul>	Red variety preferred as a cash crop and the white variety as a food crop.
Sorghum ( <i>Mapila</i> )	<ul style="list-style-type: none"> <li>- Local variety that was white- (<i>Oyera</i>) is commonly grown. The flour from <i>oyera</i> grain lasts longer than similar quantities of Hybrid sorghum flour. It takes smaller quantities of <i>oyera</i> flour to prepare the same size of meal compared to quantities of hybrid sorghum (<i>ofiira</i>) to prepare the same amount of meal.</li> <li>- Hybrid Sorghum(<i>Ofiira</i>). Yields more than <i>Oyera</i>; matures early; produces more flour but its flour does not outlive <i>oyera</i>.</li> <li>- But red sorghum has a better flavour while white sorghum has a flat taste</li> </ul>	Not grown in Karonga
Cowpea ( <i>Nseula</i> )	<ul style="list-style-type: none"> <li>- <i>Local variety (Oyera)</i>, which also is early maturing. But it also spoils (rots) faster.</li> <li>- Hybrid variety (<i>Ofiira</i>) which also does not retain a lot of moisture and does not spoil quickly</li> </ul>	Not grown in Karonga but grown in Thyolo
Common Bean ( <i>Nyemba</i> )	<ul style="list-style-type: none"> <li>- Local red-seeded variety (<i>Bareta or chimbamba</i>) is most common.</li> <li>- Local white-seeded with red/dark brown stripes variety (<i>Nanyati</i>)</li> <li>- 41</li> </ul>	<i>Mwasipenjele, Masusu, Kabulangete, Kahawa, Katumanye, Khaki bean - white/creamish and sweet</i>

	- <i>Chana</i> variety	
Sweet potatoes	- Not commonly grown	- <i>Lema, Kenya, and Joni</i>
Chilli	Birds' eye chili ( <i>Mphiripiri</i> )	- Not grown in Karonga
Rice	- Not grown in Thyolo	Kilombero, Faya, Zambia, Salima
<b>Crop</b>	<b>Thyolo</b>	<b>Karonga</b>

These qualitative findings were confirmed by the results of the formal survey (Table 8). Maize was the major food crop grown in both sites as shown by 100% of study households in Thyolo and 97% in Karonga said maize was the main staple crop. 97% of households in Karonga and 47% in Thyolo grew cassava as a food crop. 97% of households in Karonga and 47% in Thyolo grew cassava as a food crop. Pigeonpea as a food crop was grown by 68% of households in Thyolo. Although farmers sold pigeonpea for cash, most considered it to be a food crop. Other important food crops were cassava mainly in Karonga (96%) and pigeon peas in Thyolo (68%). A total of 91% of households in Karonga produced rice as a cash crop and 31% as a food crop. Sorghum (52%) and chilies (14%) were important cash crops in Thyolo. Sorghum was used in the brewing of opaque beer, which was then sold for cash income. Sorghum also was important as a fallback crop in times of drought since sorghum is more drought tolerant than maize. Pigeonpea was considered an important food crop because in times of food shortages, the grain was boiled and eaten with cassava as *makaka*, a local dish.

<b>Table 8: Food and Cash Crop production in Karonga and Thyolo (whole sample)</b>				
	<b>Karonga</b>		<b>Thyolo</b>	
	Count	%HH	Count	%HH
<b>Food Crops</b>				
Maize	222	96.5	307	100
Cassava	220	95.7	143	46.6
Pigeon peas			208	67.8
Rice	72	31.3	ng	ng
<b>Cash crops</b>				
Rice	209	90.9	ng	ng
Cassava	36	15.7	15	4.9
Groundnuts	23	10.0	-	-
Sorghum	ng	ng	158	51.5
Chilies	ng	ng	43	14.0

ng = not grown

HIV/AIDS-infected households produced a diversity of food and cash crops although maize remained their food crop (Table 9). The second major food crop for HIV/AIDS-infected households in Thyolo was pigeon pea (23.8%) and in Karonga it was cassava (37.1%). Less grown crops comprised groundnut and sweet potato together with beans, millet, bananas and tomatoes. Major cash crops for these vulnerable households in Thyolo were tomatoes (47%), chilies (13.4%) and pigeonpea (10.4%). In Karonga, rice was the dominant cash crop augmented with cassava and groundnuts. Much smaller proportions of households in Thyolo produced tea and sorghum as cash crops.

<b>Table 9: Food and Cash crops grown by HIV/AIDS-infected Households (% of Responses)</b>		
<b>Food crops</b>		
	Thyolo	Karonga
Maize	44.1	35.5
Pigeonpea	23.8	1.3
Cassava	17	37.1
Groundnuts	5.5	7.8
Sweet potato	4.7	6.8
Other	4.9	3
<b>Cash crops</b>		
	Thyolo	Karonga
Tomato	47	0
Chilies	13.4	0
Pigeonpea	10.4	0
Rice	0	79.6
Cassava	4	8.3
Groundnuts	0	5.1
	9	6.6

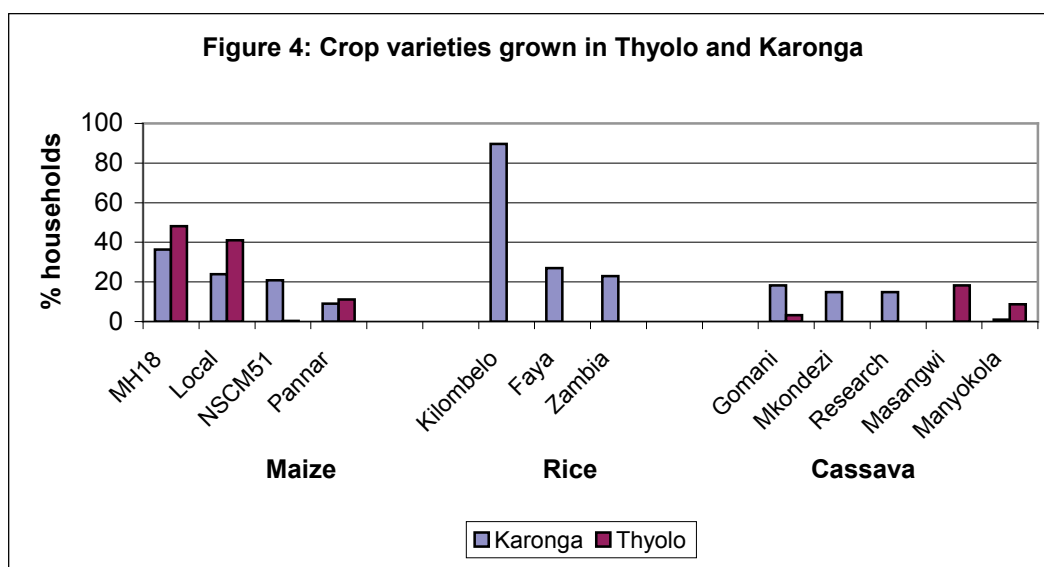
The popularity of cassava had increased in the recent past because of recurring droughts, which made maize production problematic. Rains were reported to have been erratic in the past ten years. Occasional severe hailstorms sometimes compounded with strong winds destroyed crops. Frequent floods rendered most of the land (especially in Karonga) difficult to till and this contributed to land scarcity particularly for maize and cassava production. Flooding also caused cassava roots to rot in the ground. Consequently farmers preferred to plant seed that would mature early and yield more. Overall, crop diversity in both study sites was attributed to the lack of land, unpredictable weather conditions and the unavailability of preferred seed. An important finding is the diversification of HIV/AIDS-infected households into horticultural crops particularly tomato, a less labour demanding crop for cash income. FGD revealed that generally, due to constraints to inputs such as labor, seed and fertilizer, female headed and HIV/AIDS-infected households were less inclined to participate in cash crop growing. Even membership to GACs and MACs was lower for these vulnerable community members. For example, Makanila GAC in Thyolo had 60 women out of 185 members.

The promotion of Kilombero variety of rice by NASFAM, had facilitated the uptake of the for cash income since farmers were assured of a market for their produce as well as seed which was provided by NASFAM. Other important cash crops in Karonga were cassava (15.7 percent) and groundnuts (10 percent). Although NASFAM promoted chilies in Thyolo, more farmers rated sorghum as a cash crop compared to chilies.

#### **4.2. Crop varieties grown**

Varieties grown for the most important food and cash crops were identified during qualitative discussions as shown in Table 8. These were later validated by formal

survey results (Figure 4). Popular maize varieties were Hybrid MH18, Hybrid NSCM51 and the local varieties. It was interesting to note that while FGDs showed that farmers had stopped growing local maize varieties in favour of hybrid MH18, the formal survey revealed that a sizeable proportion of households were still growing local maize varieties. 36.4% of the households in Karonga and 48.2% in Thyolo planted maize hybrid MH18. Corresponding proportions for local maize varieties were 23.9% in Karonga and 41% in Thyolo. Less than 10% of households planted the Pannar variety in both study locations. NSCM15 variety was grown mainly in Karonga by 20% of the households. More farmers in Thyolo planted hybrid MH18 and the local varieties of maize compared to Karonga.



But in Karonga, 20.8% of households planted *Chitute*, whereas in Thyolo only one household reported having grown this variety. Preference for specific crop varieties was based on some characteristics that the varieties had. For instance, preference for local maize varieties was based on the fact that it stored well, was easily poundable and the seed was readily available; one did not necessarily have to buy the seed unlike for the hybrid maize varieties. On the other hand, preference for hybrid varieties such as MH 18 (specifically for Thyolo) was because local varieties no longer produced high yields, a characteristic that farmers attributed to climate change. Since rainfall periods had become shorter and local varieties required longer growing seasons, early maturing hybrid maize varieties were preferred. Furthermore, the Malawi Government's Targeted Input Program (TIP) which has been operating since 1998/99 season had also affected the portfolio of varieties available to farmers. Under TIP smallholder farmers received free maize seed, legume seed and fertilizer. Maize seed distributed under this programme was mostly hybrid varieties<sup>6</sup>.

Rice varieties comprised *Kilombelo* grown by about 90% of households in Karonga. This was followed by *Faya* variety (27%) and *Zambia* variety (23%). Kilombelo was popular because of the support farmers received from NASFAM during production and especially in marketing of the produce. Kilombelo was said to have a good flavor as aromatic rice compared to other varieties and as such it had a ready market.

<sup>6</sup> Government Malawi has announced that it will not implement TIP from 2005/06 season.

However, the crop was susceptible to heavy flooding whereby the straw breaks more easily compared to other varieties. *Faya* and *Zambia* varieties also had ready markets and tended to do better under flooding conditions than did Kilombelo but were not as tasty. The most popular varieties of cassava were *Gomani* variety grown by 18.3% of households in Karonga and *Masangwi* planted by 18.2% of households in Thyolo.

Cassava had a whole range of varieties being grown in both sites. But there were site-specific varieties as well. For example, in Karonga, while *Gomani* was grown by 18.3 % of farmers, as low as 3.3 % grew this in Thyolo. Varieties named *Mkondezi* and *Research* were grown in Karonga and were never mentioned in Thyolo. The variety *Masangwi* was grown in Thyolo and was absent in Karonga. Some of the names given such as *Mkondezi* and *Research* are not bona fide names of the varieties. Rather they are an indication of the original sources of seed. *Mkondezi* is a research station hence the name of the variety. The variety named *research* indicates that official from Agricultural Research were responsible for introducing it to the farmers.

Preference for cassava varieties was mostly based on the potential of the variety to give high yields and on early-maturing characteristics. Some of the early maturing varieties attracted names like Six months and 41<sup>7</sup> in Karonga. Karonga usually experiences flooding. Early maturity enables the crop to escape the floods otherwise the cassava roots rot in the ground. One variety that was high yielding but was mentioned by very few respondents (6%) was called 20-20. This variety was said to have the capacity of having more tubers in the ground. Another factor determining the preference for a cassava crop was taste i.e. whether it is sweet or bitter cassava. While sweet cassava was favored for eating as a snack, the bitter cassava was good for production of flour and generally as a food security crop. It also was not prone to theft since bitter cassava requires significant amount of processing before it can be consumed, an attribute that was unpopular to the thieves.

Both HIV/AIDS-infected and affected households grew similar varieties but to differing extents. Major varieties grown by HIV/AIDS-infected households in Thyolo were local maize as shown by 42% of responses; MH18 (22%), *Bantam* (11%) and *Masungwi* (7.4%); The rest comprised of a diversity of varieties including *Pioneer* and *Pannar* for maize, *Chitembwere*, *Gomani* and *research* for cassava, *Chalimbana* for groundnuts among others. HIV/AIDS-affected households in Thyolo grew local maize variety (45%), MH18 (20%) *Chalimbana* (8.2%) and *Manyokola* (8.9%). The rest of the varieties consisted of over 10 types. Hence there was little difference between varieties grown by infected and affected households in Thyolo. Less HIV/AIDS-infected households in Karonga grew local maize (16.3%) compared to Thyolo (42%). This type of households in Karonga also grew over twenty food crop varieties of which hybrid maize MH18 (14.3%), *Gomani* (10.3%), *Mkondezi* (7.7%) and *research* (6%) were major. Similarly, HIV-affected households also grew many food crop varieties but the major ones were MH18 (13.7%), *Chitute* (11.3%), local maize (10.3%), Kilombelo (8.3%), *Gomani* (7.7%) and *Mkondezi* (6%). The similarities between infected and affected households could be due to the government TIP programme for distribution of farm inputs including seed. Rice was the main cash crop grown by HIV/AIDS-infected households in Karonga: Kilombero (47%),

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<sup>7</sup> The concept of “41” refers to early maturing. It originates from one of the first hybrid maize varieties introduced in the country because it was early-maturing and high yielding

*Zambia* variety (13.6%) and *Faya* (18.3%). In Thyolo, the main cash crop varieties grown by infected households comprised chilies commonly known as *Kapipiri* (65%) and local maize (18.7%).

### 4.3 Crop varieties less grown by farmers

One of the regularly documented impacts of HIV/AIDS is crop diversity as a way of coping with labour constraints. In line with this, the study sought to identify varieties and types of crops that were minimally or no longer produced by farmers and reasons for this. 64.3% of respondents in Karonga and 43.1% in Thyolo indicated that they had stopped growing at least one crop variety in the fifteen years. For instance 22.2% of responses in Thyolo indicated that they no longer grew local maize varieties because local varieties matured over longer growing seasons and this did not match with the current length of rainfall periods. Some households had stopped growing improved maize varieties such as MH 18 and NSCM 41 because these required fertilizer, which farmers indicated they could not afford. Higher proportions of households in Thyolo had stopped growing local maize varieties (21.1%), MH18 (3.6%) and NSCM41 (7.5%). In Karonga, only 4.3% of households had stopped growing some of the maize varieties. In Thyolo, crops such as *chitowe* (sesame seeds), *mphodza* (tiny green beans), *mchewere* (finger millet), *kalongonda* (buffalo beans) were no longer grown. In Karonga, a significant proportion of respondents (45.7%) reported to have stopped growing bluebonnet rice variety since, unlike Kilombelo rice, this type was not aromatic. They said it had no significant and good flavor/aroma, was low yielding and had low market potential. It appears that the coming in of Kilombelo rice variety replaced some traditional varieties such as this one although the investigation was not conclusive.

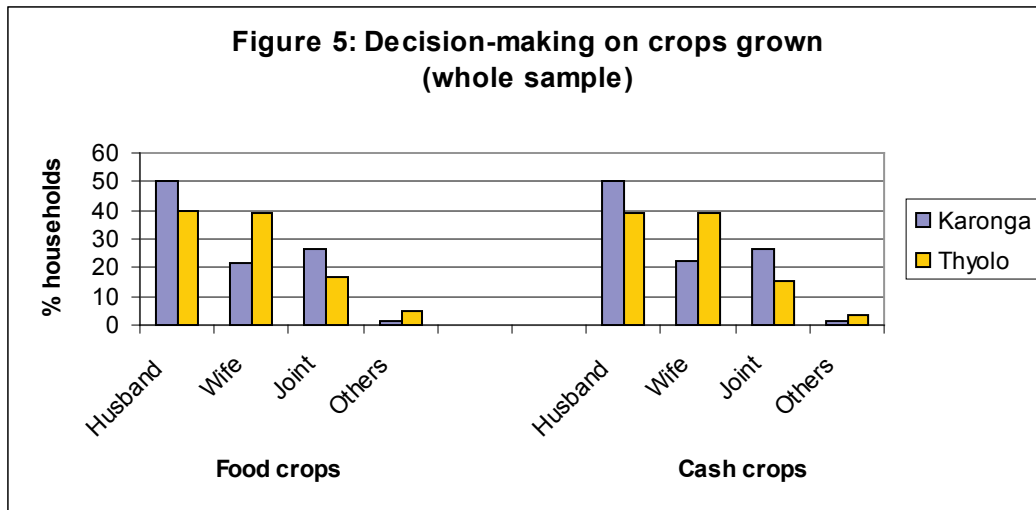
Overall, farmers in Karonga and Thyolo attributed the near-extinction of some crops and varieties to climate change particularly frequent droughts and shorter rainfall periods, low yields, late maturity, declining soil fertility, high cost of fertilizer, low market demand and susceptibility to diseases. For example FGDs reported that strong frosty winds destroyed bean and groundnut crops in Thyolo in the year 1965/66 and consequently seed was also destroyed since farmers were unable to select and retain seed. According to the farmers, some varieties were lost following this occurrence. These discussions did not establish impacts of HIV/AIDS on households' capability to continue growing certain crop varieties and leave others. What transpired was that households were facing labour and farm inputs-related constraints and some lacked cash income to purchase seed. Longitudinal monitoring of HIV/AIDS-infected households will be important to discern such changes in crop diversity, as the pandemic continues to take its toll on livelihoods.

Land scarcity had led to mixed cropping systems (e.g. maize and pigeonpea in Thyolo) and farmers alleged that this reduced the yield of the main staple, maize. Farmers also believed that some crops did not grow well in soils where fertilizer had been applied. An example given was the buffalo bean, which they said grew well on virgin land, where trees and bush had been burnt. Because such land was no longer easy to come by due to deforestation, buffalo beans were no longer extensively produced. Floods rendered soils to be waterlogged making it difficult to grow crops such as millets and yams in places like Karonga. The lack of good quality seed

worsened this situation. In both districts the participants acknowledged the proliferation of cash crops and the reduced/non use of fertilizers, as a very important factor in the extinction of local varieties.

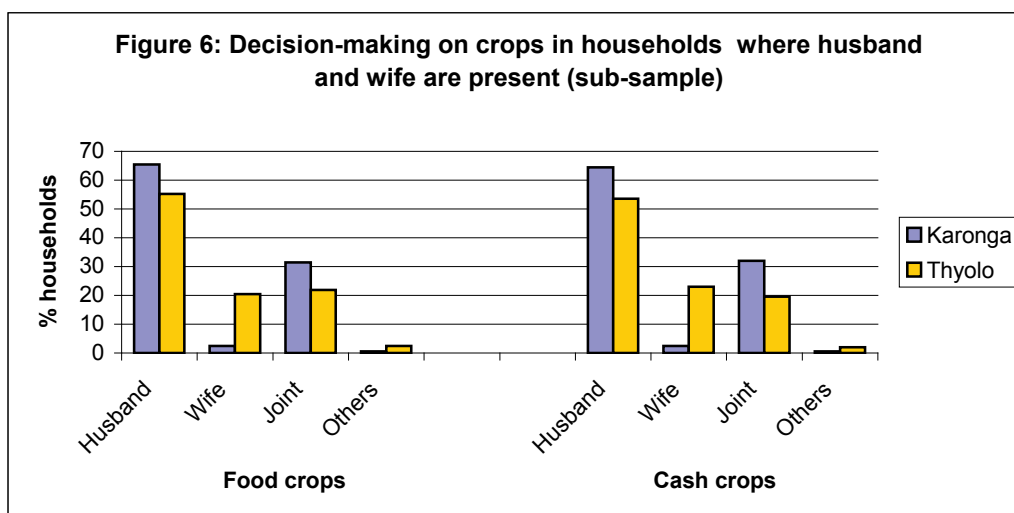
#### 4.4 Gender, HIV/AIDS and choice of crop types and varieties produced

Respondents were asked to indicate who makes decisions regarding food and cash crops to be grown. Figure 5 shows household member responsible for making such a decision. Husbands dominated decision-making on the types of crops to be grown by a household in both Karonga and Thyolo despite the differences in the inheritance systems.



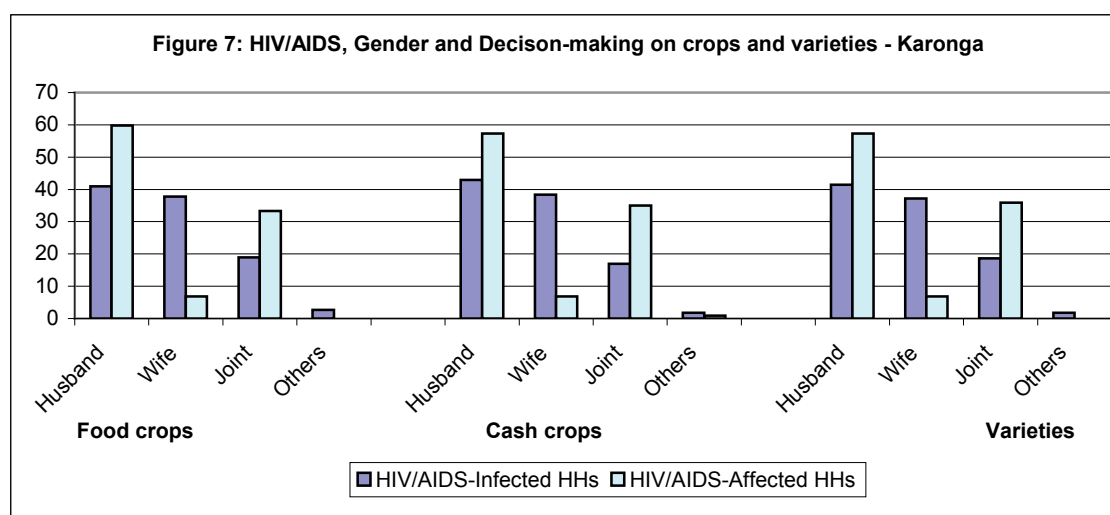
This was true for both cash and food crops. However, a higher proportion of women as wives in Thyolo made decisions on food crops (38.8%) and cash crops (39.1%) in Thyolo compared to 21.9% and 22.2% respectively in Karonga. This could be attributed to the fact that wives in Thyolo relatively have more autonomy than their counterparts in Karonga, due to the matrilineal nature of their societies. Joint decision-making between husband and wife was more profound in Karonga than in Thyolo.

Sub-sample analysis showed that decision-making in households where both husband and wife were present was also determined. Results are shown Figure 6. These results differed from those of the whole sample.

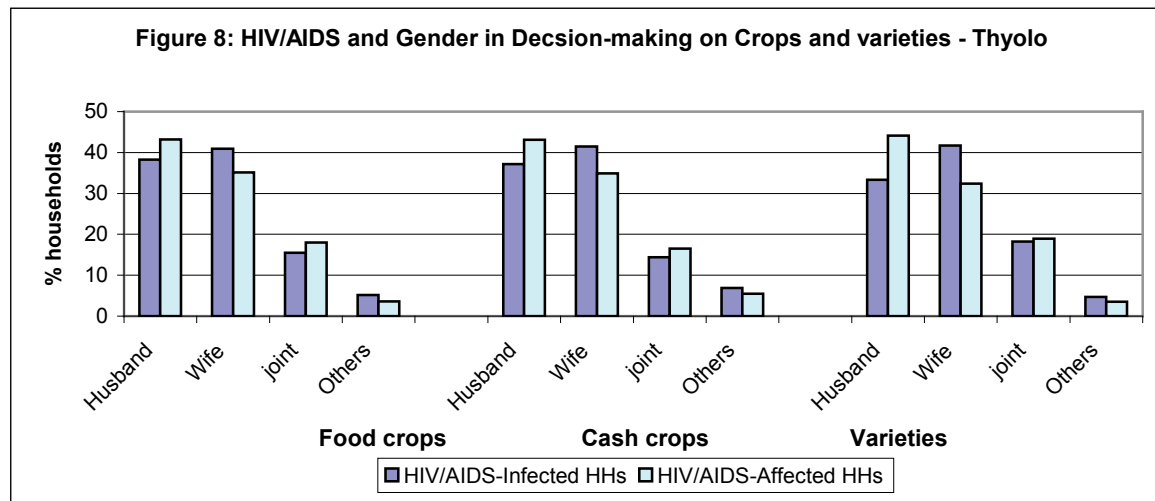


Wives in Thyolo had relatively more say on what food crops (20.5%) and cash crops (23.0%) to be grown than was the case in Karonga where only 2.4% of household had wives making such decisions. This points to a higher level of empowerment in decision-making for women in a matrilineal system compared to those in patrilineal societies. Similar to the whole sample (Fig 5), husbands in Karonga retained their larger say in deciding what food crops (65.5%) and cash crops (64.5%) to be grown as were their counterparts in Thyolo: 55.2% and 53.6% for food and cash crops respectively. A similar pattern was observed in decision-making on varieties to be grown. A higher proportion of wives (20.2 percent) in Thyolo made decisions on varieties to be grown compared to Karonga (7.6 percent).

Decision-making in households where both husband and wife were present was also determined. Results for Karonga are shown in Figure 7. Higher proportions of wives from HIV/AIDS-infected households made decisions on food crops (37.8%), cash crops (38.4%) and varieties (37.2%) to be grown compared to corresponding proportions of 6.8%, 6.8% and 6.8% respectively in HIV/AIDS-affected households. Otherwise husbands dominated decision-making across the board.



In Thyolo, proportions of wives making decisions on food and cash crops were slightly higher in HIV/AIDS-infected households compared to affected households (Fig 8). In HIV/AIDS-infected households, these proportions were 40.9% for food crops, 41.5% for cash crops and 41.7% for varieties. Corresponding values for HIV/AIDS-affected households were 35.1%, 34.9% and 32.4% respectively. This is further evidence that in matrilineal societies, women have more say in the decision making process.



#### 4.4 Summary of results on food and cash crop production

- (i) **Food crops:** Maize was the predominant staple in both Karonga and Thyolo districts and augmented by cassava and pigeonpea. Less HIV/AIDS –infected households in Karonga grew local maize (16.3%) compared to Thyolo (42%). Contrary to the expectation that pigeonpea was a major cash income earner in Thyolo, the small grain was a food crop to about 68% of the responding households. Pigeonpea is hence an important dual-purpose crop. However, reasonable proportions of HIV/AIDS-infected households in Thyolo also grew pigeonpea as a cash crop.
- (ii) **Cash crops:** Rice was a main cash income earner in Karonga while chilies were an important smallholder cash crop in Thyolo. Sorghum was rated by 52% of households in Thyolo as an important cash crop used in opaque beer brewing. Cassava was also sold for cash especially in Karonga. Higher proportions of HIV/AIDS-infected households grew tomatoes as a cash crop. This was followed by chilies and pigeonpea.
- (iii) **Varieties:** Contrary to the results of FGDs that farmers had almost stopped growing local varieties in favour of improved ones, formal surveys showed that a high proportion of farmers still planted local maize varieties. There is a high likelihood that poor access to product markets by some varieties (e.g. blue-bonnet rice) had led to their low production but better preferred varieties like Kilombelo rice were proliferating. The near-extinction of some crops and varieties was attributed to climate change particularly frequent droughts and

shorter rainfall periods, low yields, late maturity, declining soil fertility, high cost of fertilizer, low market demand and susceptibility to diseases. The Malawi government TIP programme also had added to the portfolio of varieties being grown. Preference for crop varieties depended on the knowledge farmers had on key attributes particularly the potential for high yields, drought tolerance, taste and flavour, post-harvest processing characteristics and market acceptability. Less HIV/AIDS –infected households in Karonga grew local maize compared to Thyolo. But there was little difference between varieties grown by infected and affected households in Thyolo. The similarities between infected and affected households could be due to the government TIP programme for distribution of farm inputs including seed. Popular rice varieties grown by both HIV/AIDS-infected and affected households comprised Kilombero, *Zambia* and *Faya* in order of importance.

- (iv) **Gender and HIV/AIDS:** Husbands dominated decision-making on the types of crops and varieties to be grown by a household in both Karonga and Thyolo despite the differences in the inheritance systems. However, higher proportions of women from HIV/AIDS-infected households made decisions on crops and varieties to be grown compared to those from HIV/AIDS-affected households in both districts. This has implications for technology targeting. In households where both husband and wife were residing on the farm, higher proportions of wives in Thyolo (matrilineal society) made decisions on crops and varieties to be grown, unlike in Karonga (patrilineal society).
- (v) **Lineage patterns and systems** alone were inadequate in the analysis of household investment decisions. Gender and the health status of a household also had a profound effect. R&D should hence take into account the implications of all these factors.
- (vi) **“Multi-stage” analysis** (whole-sample vs. sub-sample) was found to be very important in gender and HIV/AIDS analysis as it revealed factors that would otherwise be implicit if only whole sample analysis was carried out.

## 5. Seed Management and Knowledge and Information Transfer Pathways

Seed is storage of distinct characteristics of a crop embodied in varieties. Thus, choice of a given variety is a reflection of the preferred characteristics. These characteristics can be in the form of size of seed, appearance, color and other general features that constitute quality. The study investigated attributes that farmers looked for when selecting seed and how seed was preserved and stored. Findings are presented in the following sections.

### 5.1 Seed sources

Both formal and informal seed sources were utilised by farmers (Table 9). According to qualitative findings, seed was retained by a household, sourced from friends, relatives, neighbours and parents or purchased. FGDs showed that seed sourcing responsibilities for women and men were crop-type specific. Generally, women were responsible for sourcing food crop seed while men looked for cash crop seed.

<b>Karonga</b>						
	<i>Food crops</i>			<i>Cash crops</i>		
	Maize	Cassava	Rice	Rice	Cassava	Groundnut
TIP	51.4	0	1.3	0	0	2.1
Shops	13.1	0	0	7.6	0	27.5
Retained seed	20.7	61.6	37.4	27.4	56.6	36.5
Neighbors	4.6	31.3	2.9	2.6	28.8	9.0
NGOs	10.6	0	2.9	1.9	0	2.1
NASFAM	0	0	50.2	60.2	0	15.9
Agriculture	0	7.1	5.4	0.3	14.5	6.9
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Thyolo</b>						
	<i>Food crops</i>			<i>Cash crops</i>		
	Maize	Cassava	Pigeon peas	Sorghum	Chilies	
TIP	28.7	0	4.0	0	0	
Shops	28.9	0	3.4	2.0	0	
Retained seed	36.8	64.1	61.8	6.0	4.7	
Neighbors	27.0	33.8	28.6	3.3	2.3	
NGOs	0	0.6	2.2	0.7	2.3	
NASFAM	4.5	0	0	84.0	90.7	
Agriculture	1.1	1.5	0	3.3	0	
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	

Informal seed sources were more relied upon for food crops in Karonga and Thyolo. In Karonga farmers retained seed for maize (20.7%), cassava as a food crop (61.6%), and as a cash crop (56.6%); rice as a food crop (37.4%) and as a cash crop (27.4%) and groundnuts (36.5%). A majority of these farmers got their seed maize through TIP (51.4%), a few purchased (13.1%) or got from NGOs (10.6%). NASFAM was an important provider of seed for rice as a food crop (50.2%) and as a cash crop (60.2%).

In Thyolo, only 28.7% indicated TIP as their source of maize seed. The other sources of maize seed were more important in Thyolo than in Karonga. These comprised shops (28.9%), retained seed (36.8%) and neighbors (27.0%). Most households retained cassava and pigeonpea seed as shown by 64.1% and 61.8% of responses respectively. About one third of responses indicated that pigeonpea and cassava seed was sourced from neighbours. NASFAM provided seed for chilies and sorghum to the majority of farmers as shown by 90.7% and 84% of responses respectively.

Generally NASFAM distributed seed to its participating farmers at the beginning of the season. This ensured that farmers grew the varieties of interest (Kilombelo rice and bird's eye chilies) and also accessed good quality seed. In Thyolo, sorghum and chilies were sourced from NASFAM. While the former is a target crop for NASFAM, the latter was distributed on behalf of OXFAM under a relief program during the 2001/02 drought. The conventional government extension workers were seen not to be an important source of seed other than through the TIP program that distributed seed and fertilizer through local leadership.

The diversity in seed sources shows the importance of both formal (e.g. TIP and NASFAM) and informal (e.g. retained and neighbours) mechanisms of seed distribution by smallholder farmers. This has implications for how programs can affect farmer the seed/crop portfolio and therefore influence the survival of traditional versus modern crops and varieties.

## 5.2 Seed selection

During FGDs farmers described the various ways in which seed for both food and cash crops was selected. Good quality maize seed was selected on the basis of appearance, grain size (large grains), and preference was given to early- maturing and high-yielding varieties. Cassava seed was selected on the basis of the quality of the stems. Plants with large/thick stems and short-spaced nodes were selected, marked and left uncut in the farm. These were cut during planting time and planted at an angle at the onset of rains. Good quality sorghum, cowpea and pigeonpea seed was selected on the basis of appearance and absence of insect pests mainly weevils. Sweet potato stems were selected on the basis of absence of diseases. For chilies (*Mphiriphiri*), colour and size determined the choice of seed for planting. High quality and well-ripened (very red) pods of chilies were selected and sorting carried out to remove rotten ones. These seed selection criteria were echoed for the major food and cash crops during sample surveys. Seed selection criteria for maize and rice are shown in Table 11.

Size, appearance and general seed quality were important attributes in seed selection for these grains. Appearance referred to shininess of the seed and size to largeness and plumpness. Quality on the other hand consisted of a range of attributes that included but were not limited to appearance, uniformity in size, cleanliness and freeness from diseases.

<b>Table 11: Seed selection criteria for Maize and Rice by Study Site</b>				
<b>Attributes</b>	<b>Karonga</b>		<b>Thyolo</b>	
	n		n	
<b>Maize</b>				
Size	56	24.3	53	17.2
Appearance	33	14.4	14	5.3
Quality seed	69	30.0	46	15.0
<b>Rice</b>				
Size	30	13.5	cng	cng
Appearance	24	10.4	cng	cng
Quality seed	42	18.3	cng	cng

Mainly women as wives (53.8%) initiated seed selection in Thyolo followed by husbands (24.4%) and sometimes jointly by both husband and wife (19.1) while sons and daughters accounted for only 2.6%. In Karonga, men as husbands had an upper hand in initiating the seed selection process (46.1%) followed women as wives (30.4%), then jointly by husband and wife (22.5%); less than 1% of households stated that extension workers initiated this process. More women (43.6%) than men (41.8%) from HIV/AIDS-infected households initiated the seed selection process in Karonga; joint initiation by husband and wife was reported by 13.6% of the households while extension catered for about 1%. In HIV/AIDS infected households in Thyolo, these proportions were: women 54.1%, men (24.2%), joint (18.6%) and son or daughter (3%). Overall the initiation of the seed selection process was dominated by women in the matrilineal societies of Thyolo and by men in the patrilineal Karonga. However, women dominated this activity in HIV/AIDS-infected households from both Karonga and Thyolo.

### **5.3 Seed Preservation and Storage**

Seed preservation and storage are activities that follow seed sourcing and selection. FGDs revealed various seed preservation and storage methods by farmers. Maize seed was traditionally preserved through on the cob drying on an in-house rack placed above the fireplace or hearth and below the roof. Some farmers applied commercial pesticides the common one being actellic powder. Storage was in bags. Preservation and storage of cassava seed occurred through the process of leaving selected plants with marked stems to remain live in the fields after the rest were harvested. Sometimes stems were cut and buried in a hole under the soil and removed at planting time. Stems that germinated during this process were not used as seed because the resulting plants would be too vegetative to produce healthy tubers. When planting it was recommended that only up to two nodes on a stem should be under the soil to avoid formation of high root density and resultant competition for nutrients and water. Mostly farmers who could not afford actellic preserved sorghum seed using application of ash. In the absence of pesticides, frequent drying of grain was recommended. Storage was in bottles, khaki envelopes, and sisal bags. Plastic bags were not recommended because they retained heat and moisture, which affected the viability of the seed. Other small grains particularly pigeonpea and cowpea were preserved using ash and stored in bottles. Groundnut was preserved through drying

and stored unshelled in bags inside the house to avoid theft. Chilies were dried for preservation to avoid the development of moulds and stored in sisal bags (*ziguduli*). Rice seed was sourced from NASFAM in most cases as this assured good quality grain for the market.

Generally formal survey results bore congruence with those from FGDs. Since maize was the major food crop across the study populations, the results reported in this section and subsequent ones will concentrate on maize and on rice and chilies as cash crops. Table 12 shows maize seed preservation practices in Karonga and Thyolo.

	<b>Karonga</b>		<b>Thyolo</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Pesticide (Actellic)	88	38.3	222	72.3
Smoke	78	33.9	21	6.8
Drying	26	11.3	86	28.0
Ash	5	2.2	24	7.8
Others	3	1.3	11	3.7

In both sites, use of actellic pesticide dominated other maize seed preservation methods. However, a higher proportion of respondents in Thyolo used actellic more than was the case in Karonga. Unlike Thyolo where only 6.8% of the respondents used smoke for preserving maize seed, this method accounted for about 33.9% of households in Karonga. A higher proportion of respondents in Thyolo also used drying and application of ash (28% and 7.8%) than was the case in Karonga: 11.3% and 2.2% respectively. Other preservation methods were traditional such as mixing seed with sand before storage in a container or with leaves from plants believed to have pesticide characteristics.

The use of these preservation methods is a reflection of the seed storage methods that respondents used. Table 13 shows the various seed storage methods for maize.

	<b>Karonga</b>		<b>Thyolo</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Bags	126	58.6	232	75.6
Granary	63	20.5	7	2.3
Rack above hearth	71	23.1	18	5.9
Pot	-	-	22	7.2
Others	19	6.2	3	0.9

Bags were the most common seed storage method in both sites accounting for over 75% in Thyolo and over 58.6% in Karonga. Thus after harvest, maize was shelled and stored in bags for fear of theft if it were to be stored in granaries outside the house. Only 2.3% of responses indicated use of granaries for seed storage in Thyolo compared to 20.5% in Karonga. The practice in Karonga was that a good proportion of farmers stored seed maize and grain together in the granaries and only selected

seed at the time of planting; or seed was selected at the time of harvesting and stored above the hearth so it could be preserved by smoke. These methods were minimally used in Thyolo.

Responsibilities for household seed storage are shown in Table 14.

<b>Table 14: Responsibility for Seed Storage by site and type of household (% Responses)</b>						
<b>Karonga</b>						
	<i>Count</i>	<i>All HH</i>	<i>Count</i>	<i>Male-HH</i>	<i>Count</i>	<i>Female HH</i>
Father	94	40.9	85	45.9	8	19.5
Mother	105	45.7	72	38.9	31	75.6
Joint	23	10	23	12.4	0	0
Other	4	1.6	1	0.5	2	4.8
<b>Thyolo</b>						
	<i>Count</i>	<i>All HH</i>	<i>Count</i>	<i>Male-HH</i>	<i>Count</i>	<i>Female HH</i>
Father	51	16.6	44	28.8	7	7.5
Mother	176	57.3	95	62.1	80	86.0
Joint	18	5.9	18	11.8	0	0
Other	9	2.9	3	2.1	6	7.5

In both sites, women were very important in seed storage. Even in a male dominated society as Karonga, ratings for women as responsible persons for this activity were higher (45.7%) compared to 41% for men, in the overall sample. In male-headed households, more fathers (46%) than mothers (39%) were rated responsible for seed storage in Karonga. The converse was the case in Thyolo where mothers dominated in Male-headed households and in female-headed households as shown by 62% and 86% of responses respectively. These findings show that although men dominated decision-making on what crops and varieties to be produced for food and cash income, higher proportions of women held the responsibility for seed storage. FGDs reiterated the finding that women were generally more responsible than men in storing seed. Several reasons were given for this: women as wives stayed at home and took care of the homesteads most of the time while men as husbands were prone to frequent traveling; secondly, from experience, men often sold seed for cash and used the proceeds for non-productive activities like beer drinking; lastly, women household heads were even more responsible because the burden of sourcing for seed often fell on them in times of lack.

Women (69.1%) held the responsibility for seed storage among HIV/AIDS-infected households in Thyolo compared to men (17.1%); while both husband and wife held joint responsibility in 6.6% of the cases. Others included sons, daughters, grandparents and other extended family relations. The same trend was found in Karonga where women (57.7%) dominated in this activity although more men were involved in Karonga (32%) than in Thyolo. Joint responsibility by husband and wife accounted for 7.2% of the responses. The rest were sons, daughters, grandparents and relatives/friends. In this type of households, women (50%) too dominated cash crop

seed storage responsibility compared to men (34%) in Karonga. In Thyolo, these proportions were 64.5% and 26.6% respectively.

#### 5.4 Inter- and Intra-generational Knowledge and Information Transfer Pathways

An important focus of this study was to identify and understand pathways of transfer of knowledge regarding seed within and between generations. This encompassed knowledge on types and varieties of crops grown and seed management practices particularly seed selection, preservation and storage. Intra-generational knowledge transfer was assessed along two major pathways: farmer to farmer and extension workers and farmers. Inter-generational knowledge transfer was taken as being from parents or grandparents to children.

##### 5.4.1 Intra-generational knowledge and information transfer pathways

Table 15 shows knowledge sources on seed selection. The types of sources utilised were an indication of whether knowledge transfer was inter-generational or intra-generational. Two main intra-generational sources of seed knowledge stood out: agricultural extension services and neighbours.

	<b>Karonga</b>		<b>Thyolo</b>	
<b>Food Crop</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
	<b>Maize</b>		<b>Maize</b>	
Grand parent	31	13.5	104	33.9
Father	23	10	26	8.5
Mother	15	6.5	12	3.9
Neighbors	23	10	41	13.4
Extension workers	79	34.3	76	24.8
Others	4	2.2	4	1.3
	<b>Rice</b>		<b>Chilies</b>	
<b>Cash crop</b>				
Grand parent	22	10.6	2	0.7
Father	12	5.8	2	0.7
Mother	11	5.3	1	0.3
Neighbors	22	10.6	23	7.5
Extension workers	130	62.8	108	35.2
Others	6	2.9	1	0.3

There was a clear difference between sources of knowledge on seed selection for maize as a major food crop in both study locations and rice and chilies as key cash crops. Seed knowledge on maize was sourced from Extension services as shown by 34.3% of responses in Karonga and 24.8% in Thyolo. Grandparents (13.5%), fathers (10.5%) and neighbours (10%) formed the next important sources of knowledge on maize seed selection. There was a higher reliance on grandparents (33.9%) and neighbours (13.4%) as sources in Thyolo than in Karonga.

Extension workers were the dominant knowledge sources on cash crops as shown by 62.8% of responses in Karonga and 35.2% in Thyolo. This difference between study locations could be attributed to the fact that the crops under scrutiny were different. It is likely that seed selection for rice is more critical than seed selection in chilies. First, one would be worried about selecting only true-to type variety to avoid mixing with other varieties of rice. In the case of chilies, the variety is distinct and is the only one then being grown. Secondly, one would be worried about selecting disease free seed in rice unlike in chilies where it is easier to sort health from rotten pods.

The findings suggest a probable distinct difference between knowledge sources on traditional and modern crops. For traditional crops such as maize, informal sources of knowledge tended to be more important than the formal sources. In total parents including grandparents accounted for about 46% of responses for maize in Thyolo compared to 29% in Karonga. Hence combinations of formal (extension) and informal (parents and neighbours) sources of knowledge were important for maize as a food crop. For cash crops and to be precise, new crops, formal sources of knowledge were more relied upon. This is because of the commodity-specific extension that NASFAM used to accompany cash crop production to ensure adequate quantity and quality for the market. Is there a learning curve whereby formal sources dominate the early stages of introduction of a new crop, and during later stages, the informal sources take over as some farmers within the society become experts on such crops? This is an empirical question that goes beyond the scope of this study.

The two stages are both vulnerable to the impacts of HIV/AIDS. When extension workers succumb to morbidity and mortality due to HIV/AIDS knowledge transfer is impaired. This is likely to have a bigger impact on the introduction of improved and new varieties and crops since this is where formal extension has a comparative advantage over traditional knowledge transfer pathways. As the crop or variety status changes from new/improved to traditional, informal knowledge sources such as parents, neighbours or relatives become important. When these sources are distracted by HIV/AIDS impacts knowledge transmission is again limited. Again this is an area requiring further research.

Institutions like farmers' associations and those involved in the provision of credit constituted the other source of knowledge. The study inquired about organisations that were involved in the provision of farm inputs in Karonga and Thyolo and sought to find out if farmers gained seed knowledge through this intervention. In Thyolo these organisations consisted of mainly NASFAM as stated by 76.6% of households and the government (6.2%). Others were CADECOM, Iponga and OXFAM. In Karonga the government intervention was predominant as shown by 91% of households. Others comprised NASFAM, Iponga and churches. About 72% of households belonged to farmers' clubs in Thyolo. In Karonga, 89.6% of farmers belonged to farmers' clubs. These were basically NASFAM marketing clubs. A key finding was that most households reported not to have gained seed knowledge from these organisations on selection and management of seed. In Karonga, 75% of households reported not to have gained any knowledge on seed selection from these organisations; 69% were not taught any seed management by these institutions. In Thyolo these proportions were 70% and 84% respectively. Clearly, these types of intervening organisations did not have a significant impact on the vulnerable households in so far as seed knowledge is concerned. However, farmers reported to have gained some knowledge on seed

selection (e.g. not mixing seed, observing quality and timely selection) and on seed management (e.g. preservation using pesticide such as actellic, timely preservation, storage techniques and not replanting hybrids).

#### 5.4.2 Inter-generational seed knowledge and information transfer

Data in table 16 show how the knowledge is passed on between generations. There were three types of pathways through which seed information was passed on to children: involvement of the youth in seed management activities, children learning about seed management in school, and by the parents teaching their children. The terms “teaching” and “involvement” were defined differently: one could teach without involving the children in seed management activities but by actual participation in seed management work, children were involved.

Information pathway	Karonga			Thyolo		
	All (%)	Male HH (%)	Female HH (%)	All (%)	Male HH (%)	Female HH (%)
Involvement	65.7	74.1	61.0	52.9	4.8	36.2
Learn in school	11.3	8.6	17.1	7.6	1.9	9.6
Teach children	72.6	63.8	48.8	51.9	59.5	29.8

In both sites, involvement of children and teaching were the most important pathways. Analysis by type of household indicated some differences especially in Thyolo. Only 4.8% of households said they passed on knowledge through involving the children compared to 36.2% who taught them. However, more male-headed households (59.5%) said they pass on knowledge through teaching the children compared to 29.8% female-headed households. Generally more female headed households than male-headed households in both Thyolo and Karonga said they let their children learn about seed in school.

Among the HIV/AIDS-infected households in Thyolo, grandparents were the major source of seed selection information as shown by 31% of responses. Next in importance were extension workers (30%), neighbours (12%), fathers (10.5%), mothers (8%) and others such as relatives and the radio. Extension workers (67%) and neighbours (14%) dominated the information sources on cash crops among infected households. In Karonga, sources of information on food crops were mainly extension worker (35%), grandparents (17%), neighbours (15%), mother (14%) and father (13%). The rest were other relatives and teachers. Information sources on seed selection for cash crops comprised Extension (58%), grandparents (14%), father (9%), mother (5%) and neighbours (13%). The rest were teachers. Schools played a minimal role in informing on seed selection. On the whole, information on seed selection for food crops among HIV/AIDS-infected households was mainly sourced from parents including grandparents, extension services and neighbours. Extension services were the key sources of seed selection information on cash crops in both study locations.

Knowledge and information pathways for children from households infected by HIV/AIDS were similar to those earlier discussed for the whole sample: teaching including teaching by doing or encouraging children to work so they can learn (67%), involvement in seed issues (24%) and sending children to school to learn (4%) other

methods included the sharing of information. Corresponding proportions for Karonga were: teaching by doing including encouraging children to work and learn (80.5%); involvement in seed issues including participation in club activities and the sharing of information on seed (15.5%); and sending children to school (3%). Overall, inter-generational knowledge transfer was to the largest extent based on interaction between parents and children. The challenge lies in the fact that if parents are chronically ill or succumb to early deaths due to HIV/AIDS, children will increasingly lack the older generation that should teach them by doing. The study found out that minimal proportion of chronically ill parents transferred seed knowledge to their children. Chronically ill persons did not transfer knowledge on seed selection (87%), seed preservation (87%) and seed storage (86%). In Karonga the chronically ill failed to transfer knowledge on seed selection (80%), seed preservation (80%) and seed storage (81%).

Generally recipients of seed knowledge in Thyolo were mothers as shown by (41.5%) of responses. The rest consisted of fathers (10%), children (4%) and other relatives; 39% of responses were non-committal as they catered for cases where chronic illnesses had not been experienced. But within HIV/AIDS-infected households, most of those that transferred some knowledge in Thyolo targeted the girl child as shown by 37% of the responses; the boy child (19%), grandchildren (22%), relatives (14%); the rest of the beneficiaries including wives accounted for 8%. General recipients of knowledge in Karonga comprised the boy child (45%), girl child (20%), grandchildren (13%), relatives (12%) and other beneficiaries including husbands and wives (12%). Within HIV/AIDS-infected households in Karonga seed knowledge was passed onto the boy child (49.7%), the girl child (19.7%), grandchildren (9.6%), relatives (8.8%), wives (6.4%) and sometimes between husband and wife. Although both the girl and boy children were targeted, knowledge was transferred to more girl children in the matrilineal societies while the converse was the case in patrilineal societies. Cases of knowledge transfer to grand children show the role of the elderly in transmission of knowledge mainly to orphans.

## **5.5 Summary of findings on seed management and knowledge transfer pathways**

- (i) Seed sources:** Both formal and informal seed sources were utilised by farmers. Informal seed sources were more relied upon for most food crops. These comprised seed retained from the previous season's harvest and neighbours. Seed purchases, NGOs and the government TIP programme were the main formal seed sources. NASAFAM was the most important provider of seed for rice and chilies, the major cash crops. This was part of NASAFAM's commodity-specific extension.
- (ii) Sources of seed knowledge:** Two main intra-generational sources of seed knowledge stood out: agricultural extension services and neighbours. Seed knowledge on maize, the main staple, was sourced from extension services. Extension workers were the dominant knowledge sources on cash crops and contributed largely to food crops. Inter-generational knowledge sources were mainly parents and grandparents. Seed knowledge among HIV/AIDS-infected households was also sourced from parents including grandparents,

extension services and neighbours. The findings suggest a probable distinct difference between knowledge sources on traditional and modern crops. For traditional crops such as maize, informal sources of knowledge were more important. Hence combinations of formal (extension) and informal (parents and neighbours) sources of knowledge were deemed important. For cash crops and new crops, formal sources of knowledge were more relied upon. This is because of the commodity-specific extension that NASFAM used to accompany cash crop production to ensure adequate quantity and quality for the market. This suggests a learning curve whereby formal sources dominate the early stages of introduction of a new crop or promotion of an improved variety but during later stages, the informal sources take over as some farmers within the society become experts on such crops. This is an empirical issue that requires longitudinal tracking to establish the facts.

- (iii) **Farmers' clubs and seed knowledge transfer:** Over 70% of study households belonged to farmers' clubs, mostly those backstopped by NASFAM. A key finding was that over 80% of study households reported not to have gained seed knowledge from these organisations. Clearly, these types of intervening organisations did not have a significant impact on the vulnerable households in so far as seed knowledge is concerned. However, the few benefiting households reported to have gained some knowledge on seed selection and management.
- (iv) **Seed management:** A combination of traditional and modern methods for seed preservation and storage were utilised. The former was more utilised in Karonga and the latter in Thyolo. In both sites, women were very important in seed storage. Although men dominated decision-making on what crops and varieties to be produced for food and cash income, higher proportions of women held the responsibility for seed storage. In HIV/AIDS-infected households, more women than men were responsible for seed storage.
- (v) **Seed knowledge transfer:** Both formal and informal channels of seed knowledge transfer were utilised. Grandparents and parents were the common inter-generational sources of seed knowledge while extension and neighbours dominated the intra-generational sources. There were three types of pathways through which seed information was passed on to children: involvement of children in seed management activities, parents teaching their children; and by children learning about seed management in school although these played a minimal role. These pathways were similar to those in households infected by HIV/AIDS. Overall, inter-generational knowledge transfer was to the largest extent based on interaction between parents and children. The challenge lies in the fact that if parents are chronically ill or succumb to early deaths due to HIV/AIDS, children will increasingly lack the older generation that should teach them by doing. In fact minimal proportions. In some cases well over 80% of households did not report knowledge transfer by the chronically ill members. In the few cases where the converse was true, both the girl and boy child was targeted. Knowledge was transferred to more girl children in the matrilineal societies while the converse was the case in patrilineal societies. Cases of knowledge transfer to

grandchildren show the important role of the elderly in transmission of knowledge mainly to orphans.

## **6. Meso-level institutions in mitigating the impacts of HIV/AIDS on Crop production and seed knowledge transfer**

### **6.1 Why Institutional Analysis?**

As earlier discussed, an analytical framework that cuts across the micro and macro environments within which HIV/AIDS impacts are experienced guided this study. One of the critical levels of analysis for this study was the meso-environment at which impacts of HIV/AIDS on farming systems and community institutions are most felt. A key constraint at this level was assumed to be family institutional breakdown due to HIV/AIDS, making it necessary for local supportive institutions to fill in where traditional structures were overstretched or were likely to disintegrate and render agricultural knowledge pathways ineffective. The study therefore aimed to identify new options to enhance access to agricultural knowledge and information by those vulnerable as a result of HIV/AIDS. One way to do this was by understanding the functioning of meso-level institutions involved in mitigating HIV/AIDS impacts on agriculture in Malawi so as to strengthen dialogue between local knowledge, modern technologies and agricultural services.

### **6.2 The role of meso-level organisations in mitigating HIV/AIDS impacts**

Assessed were the roles of institutions and organizations in the transfer of agricultural technologies and how this was linked to HIV/AIDS. Several agriculture and HIV/AIDS related organisations were purposively selected and interviewed using semi-structured questionnaires. The research question was: to what extent do these organizations address HIV/AIDS related issues? Findings are summarized in Table 17.

Both development and research institutions were involved in mitigating HIV/AIDS impacts. As shown in Table 17, meso-level organisations implemented a broad diversity of activities including technology promotion. These activities fall into three broad categories:

- (i) **Food Security, relief and nutrition:** horticulture particularly integrated nutrition gardens; crop production including seed multiplication; food processing and post-harvest storage; nutrition improvement through diet diversification; provision of farm inputs such as seed, fertiliser and farm implements; small scale irrigation e.g. construction of canals and provision of treadle pumps for winter cropping; livestock and aquaculture management programs to improve nutrition; and agricultural credit schemes. Crop-based technologies comprised legumes and cereals aimed at improving the nutrition of the vulnerable. Cassava, maize, beans, sweet potatoes, Irish potatoes, vegetables, fruit trees, groundnuts, pigeon pea, bambara nuts, cow peas, sorghum, rice, chick pea, soya beans and millet were among the crops promoted.

- (ii) **Natural resources management:** integrated soil fertility management and improvement; soil and water conservation; construction of boreholes for water provision. Agro forestry through simultaneous intercropping, relay cropping and improved fallows.
- (iii) **Capacity building:** farmer training, farmer experimentation with crops and animal fodder.
- (iv) **Poverty alleviation:** Raising household incomes through support in non farm activities, identification/creation of product markets, small scale credit schemes
- (v) **Technology development:** developing new technologies to be used by farmers. Technology development organisations consisted of the NARS and international Agricultural Research Centers particularly ICRISAT, the World Agroforestry Center, CIAT and IITA through its cassava network SARRNET.
- (vi) **Mitigating impacts of HIV/AIDS:** agriculture and nutrition interventions, prevention through awareness creation; and the promotion of voluntary counseling and testing.
- (vii) **Gender inclusiveness:** Deliberate targeting of women, the elderly and orphaned children among other vulnerable population groups with specific projects and programmes.

**Table 17: Characteristics of HIV/AIDS-based Meso-level Agricultural Institutions in Malawi**

<b>Organization</b>	<b>Years in Malawi</b>	<b>HIV/AIDS Activities</b>	<b>Spatial Coverage</b>
Food and Agriculture Organization -FAO	3	Diet diversification programme targeting the vulnerable Makes use of Ministry of agriculture extension services	Every district in Malawi (600,000 people)
IITA/SARRNET	11	Developed technologies: new and improved varieties of cassava and sweet potatoes, processing equipment, livestock feed and general product development Have worked with Save the children in Nkhotakota, Dedza and Nkhata Bay but no HIV/AIDS activities yet. Main HIV/AIDS activity so far is sourcing for funding	Throughout the country but with impacts focus areas in Mulanje, Blantyre, Chikwawa, Nsanje, Zomba, Lilongwe, Mchinji, Nkhotakota, Kasungu, Mzimba and Nkhatabay. (800,000)
Citizen Network For Foreign Affairs (CNFA)	3	Production of less-labour-intensive crops that can be managed by HIV/AIDS patients and guardians	All districts (Not estimated)
Plan International	10	Voluntary counseling and testing Sensitisation through awareness campaigns	Parts of Lilongwe, Kasungu and Mzimba. (20,000)
CIAT	6	Just started formation of clubs to be involved in awareness campaigns and promotion of voluntary counseling and testing Developed technologies: improved bean varieties and integrated pest management for beans Works with Ministry of Agriculture extension and contributes to capacity building through training of government staff. Also on-farm trials and demonstrations	Lilongwe, Dedza, Kasungu and Mzimba (2,000)
World Agroforestry Center	17	Nutrition gardens Reduction in farm labour demands Developed technologies in simultaneous intercropping, relay intercropping, improved fallows, high value agro-forestry trees, biomass transfer and integrated nutritious gardens. Minimal extension work	Zomba, Machinga, Kasungu, Chiradzulu, Blantyre, Thyolo, Mulanje, Lilongwe, Chikwawa, Mchinji, Rumphu, Nkhatabay, Dedza, Balaka, Ntcheu, Salima, Mangochi
International Crops		Promotion of small grains: high nutritive value legumes	The whole country

Research Institute for the Semi-Arid Tropics (ICRISAT)		( groundnut and pigeonpea) and cereals (sorghum and millet) Woks through NASFAM extension and Ministry of Agriculture Initial work has also included research on HIV/AIDS	
Concern Worldwide	3	Promote grain banks to be accessed by poorest and vulnerable households and the sick in accordance with community constitutions. Work through Ministry f Agriculture extension staff or through direct training of community extension volunteers and committees.	Dowa, Lilongwe, Mchinji, Nkhotakota
Oxfam	16	Sensitization for farmers and staff Free farm distribution of farm inputs including relief food Works through Ministry of Agriculture extension system and other local NGOs. Provides extension support in terms of transport and training.	Mulanje, Thyolo and Phalombe. In partnership with NGO's-Chikwawa, Balaka, Machinga, Ntcheu, Zomba.
Evangelical Lutheran Development Program (ELDP).	5	Home-based care and orphan care Irrigation schemes for home nutrition gardens	Chikwawa, Phalombe, Dedza, Dowa, Nkhatabay and Karonga.
Catholic Relief Services (CRS)	6	Agricultural model to support vulnerable groups Funds and works through the Home-based Care Commission	Mchinji, Neno, Lilongwe, Kasungu, Mzuzu.
The Hunger Project-Malawi	5	Prevention including awareness creation and condom use Gender	Zomba (in Jali and Nsandole areas), Chikwawa in Nchalo and Blantyre in Mpingo
Churches Action in Relief and Development- CARD	8	Relief support to infected and affected families to improve nutrition Promote voluntary counseling and testing (VCT). Has in-built extension facility for technology transfer	
Self Help Development International	10	Voluntary counseling and testing Sensitisation through awareness campaigns HIV/AIDS mainstreamed in every activity	

### 6.3 Transfer of Germplasm and Knowledge

Institutions interviewed were involved in germplasm and technological knowledge transfer. For instance, knowledge on the use of herbicides and seed treatment was transferred together with the technology. Types of knowledge transferred to smallholder farmers involved crop husbandry practices e.g. cassava management, grafting knowledge; post-harvest storage; vegetable production methods; small-scale irrigation management; and conservation tillage. Crop varieties targeted are summarized in Table 18.

**Table 18: Crop Varieties promoted by HIV/AIDS-Impact Mitigating Organisations**

Crop	Varieties	Remarks
Maize	Hybrid because it is high yielding and matures early, hence easy to achieve the food security objective. Quality Protein Maize because it is nutritious both for human and animal e.g. poultry ZM 421- drought mitigation	OPVs because they can be recycled for 3 to 4 years. In this case seed availability and accessibility is enhanced.
Cassava	Manyokola recommended by SARRNET and it sweet such that people can eat it fresh. It is also drought tolerance and locally found. Bondamali because it is sweet and locally found. It also matures early Sauti, Maunjiri, Siliva, Mkondezi are high yielding and disease resistance.	Drought tolerance, early maturing and high yielding attributes are key to adoption
Groundnuts	CG7 and Chalimbana	-
Beans	Nalipira, Nanyati, Mohiwa, Namgaga, Kanchidzi, Muhaliwa, Kobolobala, Sapatsika, Phalombe	Farmers choose themselves the varieties they find suitable
Pigeonpea	Mostly local varieties	Those that are locally found and are used as fallback crop, when maize crop has failed
Sweet potato	Kenya, Mugamba, Cemsa, Salera and Tainon, are high yielding varieties.	High-yielding qualities important Tainon is also liked because it is a precursor of vitamin A.

In addition farmers were taught the attributes of various crop types and varieties particularly the length of maturity, disease and drought resistance/tolerance. Farmers were also trained on how to add value to their produce for both nutrition and marketing. This included the observation of such quality standards as sorting, appearance and the absence of pests and foreign materials.

On-farm trials and demonstrations were carried out using farmer research and extension groups; individual farmers were utilised as channels of germplasm and knowledge transfer. Field days, learning / exchange visits and print media such as posters were also utilised. Following these approaches, farmers chose the technologies they preferred most. Seed was also distributed alongside these activities. NGOs and farmers' associations such as NASFAM, CARD, ELDP, Emmanuel International, had extension workers who interacted directly with farmers. Other organizations worked through community extension volunteers and committees to implement community gardens, training of trainers sessions and to promote farmer-to-farmer extension.

What was not explicit from the institutional analysis was how seed knowledge was transferred between and within generations. It appears that seed transfer mechanisms promoted by these organisations were only intra-generational with a heavy reliance on formal extension methods including farm trials by technology development institutions. It was not clear how the potential of these organisations could be harnessed for inter-generational seed knowledge transfer. Even within generations, most organisations concentrated on the attributes that would assist farmers to select the right crop varieties and on how to plant the seed and manage the crops in the field. Their added involvement was mainly in the provision of seed but the actual seed selection process remained implicit.

#### **6.4 HIV/AIDS Dimension of Agricultural Programs**

Organisations intervening in HIV/AIDS situations applied a matrix of strategies summarized below.

##### **Development organisations**

These deliberately targeted HIV/AIDS affected households such as those keeping orphans or community based organization taking care of orphans and people living with HIV/AIDS (PLWHA). These target groups received free food and farm inputs as part of safety net programmes. Development institutions also were involved in capacity building. Farmers were trained in agricultural production, processing and utilization. Labour-saving and low-cost production technologies were promoted among HIV/AIDS and other vulnerable groups. Increasingly these organisations were working towards mainstreaming HIV/AIDS in their development activities by conducting awareness campaigns and providing support and care for the vulnerable.

##### **Research Organisations**

These institutions focused on the provision of new and improved technologies. They emphasized the need for less labour-intensive and early maturing varieties for people infected and affected by HIV/AIDS so that they could produce enough food and sell the surplus for income. Once they produce enough food, they can sell the surplus and use that money to buy other necessities.

#### **6.5 Lessons Learnt on meso-level institutions**

- (i) Broad focus:** Meso-level institutions intervening in situations of HIV/AIDS implemented a broad portfolio of activities ranging from food security, relief and nutrition through natural resources management, income generation through technology development, mitigating impacts of HIV/AIDS and gender inclusiveness. These activities addressed both research and development.
- (ii) Intra-generational vs. inter-generational knowledge transfer:** Most focus by these organisations was on the transfer of knowledge within generations. Strategies such as formal extension and farmer-to-farmer extension were utilised mainly to teach farmers on crop varieties and their performance and in the distribution of farm inputs mostly seed, fertiliser and farm implements. Clarity is required on how the potential of these

organisations could be harnessed for inter-generational seed knowledge transfer.

## **7. Summary of Research Findings and Policy Recommendations**

### **(iii) Socio-economics**

#### *Inheritance Patterns and Household characteristics*

Generally men dominated household headship regardless of the inheritance systems. In the patrilineal societies in Karonga, most female-headed households belonged to widows while in Thyolo where the inheritance pattern was matrilineal, such widows accounted for half the households headed by women; the rest being single women, mainly divorcees. More women in Thyolo were better placed to make investment decisions without interference from their husbands' lineage although the scale of limitation from the women's lineage was not established. Household heads in Thyolo were less educated than those in Karonga.

#### *Child-headed households*

Proportions of child-headed households in Thyolo and Karonga were negligible. Instead, the extended family provided an important safety net for orphaned and vulnerable children. This is a challenge for intervening organisations that target child-headed households. More research is required.

#### *HIV/AIDS and Gender*

Most HIV/AIDS-infected households were female-headed. They had less farm and non-farm income than affected households. Their average size in Karonga was about twice as large as for Thyolo. Higher proportions of households in Thyolo had a chronic illness at the time of the study compared to Karonga. Relative to other household members, more mothers were chronically ill in Thyolo. This is bound to aggravate the vulnerability of households headed by women given that these were higher in this district than in Karonga.

*Land scarcity* was an overarching constraint to production across the study sites. Rain-fed and irrigated land in Thyolo was less than in Karonga.

### **(iv) Food and cash crop production**

Maize was the predominant staple in Karonga and Thyolo districts. It was augmented by cassava and pigeonpea. Contrary to the expectation that pigeonpea was a major cash income earner in Thyolo, the small grain was a food crop to about 68% of the responding households. Pigeonpea is hence an important dual-purpose crop. However, reasonable proportions of HIV/AIDS-infected households in Thyolo also grew pigeonpea as a cash crop. Rice was a main cash income earner in Karonga while chilies were an important smallholder cash crop in Thyolo. Sorghum was rated by over fifty percent of households in Thyolo as an important cash crop used in opaque

beer brewing. Higher proportions of HIV/AIDS-infected households grew tomatoes as a cash crop. This was followed by chilies and pigeonpea.

**(v) Varieties:**

Although the results of FGDs showed that most farmers were growing improved crop varieties, formal surveys revealed a relatively high proportion of farmers who still planted local maize varieties. Preference for crop varieties depended on the knowledge farmers had on key attributes particularly the potential for high yields, drought tolerance, taste and flavour, post-harvest processing characteristics and market acceptability. The Malawi government TIP programme also had added to the portfolio of varieties being grown by consisted supplying of farm inputs particularly seed.

Poor access to product markets by some varieties (e.g. bluebonnet rice) had led to their low production while better preferred varieties with ready markets (e.g. Kilombelo rice) were proliferating. Generally farmers in Karonga and Thyolo attributed the near-extinction of some crops and varieties to climate change particularly frequent droughts and shorter rainfall periods, low yields, late maturity, declining soil fertility, high cost of fertilizer, low market demand and susceptibility to diseases. None of the households attributed this to HIV/AIDS impacts. These FGDs did not establish impacts of HIV/AIDS on households' capability to continue growing certain crop varieties and leave others. What transpired was that households were facing labour and farm inputs-related constraints and some lacked cash income to purchase seed. Formal survey results showed that less HIV/AIDS –infected households in Karonga grew local maize compared to Thyolo. But there was little difference between varieties grown by infected and affected households in Thyolo. The similarities between HIV/AIDS-infected and affected households could be due to the government TIP programme. More research is required particularly longitudinal monitoring of HIV/AIDS-infected households to discern such changes in crop diversity and the drivers of change.

**(vi) Gender and HIV/AIDS in crop production**

Husbands dominated decision-making on the types of crops and varieties to be grown by a household in both Karonga and Thyolo despite the differences in the inheritance systems. However, higher proportions of women from HIV/AIDS-infected households made decisions on crops and varieties to be grown compared to those from HIV/AIDS-affected households in both districts. This has implications for technology targeting. In households where both husband and wife were residing on the farm, higher proportions of wives in Thyolo (matrilineal society) made decisions on crops and varieties to be grown, unlike in Karonga (patrilineal society). Hence lineage patterns and systems alone were inadequate in the analysis of household investment decisions. Gender and the health status of a household also had a profound effect. R&D should hence take into account the implications of all these factors.

“Multi-stage” (whole-sample vs. sub-sample) analysis was found to be very important in the analysis of gender analysis and HIV/AIDS impacts as it revealed factors that would otherwise be only implicit if only the whole sample analysis was carried out.

## **(vii) Seed management and knowledge transfer pathways**

### *Seed sources*

Both formal and informal seed sources were utilised by farmers. Informal seed sources were more relied upon for most food crops in Karonga and Thyolo. These comprised seed retained from the previous season's harvest, neighbours. Seed purchases, NGOs and the government TIP programme were the main formal seed sources. NASAFAM was the most important sole provider of seed for rice and chilies, the major cash crops. This was part of NASAFAM's commodity-specific extension.

### *Seed selection*

Initiation of the seed selection process was dominated by women in the matrilineal societies of Thyolo and by men in the patrilineal Karonga. However, women dominated this activity in HIV/AIDS-infected households from both Karonga and Thyolo.

Farmers knew the attributes to look for in seed selection. Size, appearance and general seed quality were important attributes in seed selection. Appearance referred to shininess of the seed and size to largeness and plumpness. Quality on the other hand consisted of a range of attributes such as appearance, uniformity in size, cleanliness and freeness from diseases.

This was backstopped by two main intra-generational sources of knowledge on seed selection: agricultural extension services and neighbours. Extension services were useful in the introduction of new and improved crops and varieties. Inter-generational knowledge sources consisted mainly of parents and grandparents even in the case of HIV/AIDS-infected households. These prevailed mainly in food crop production. The findings suggest a probable distinct difference between knowledge sources on traditional and modern crops and varieties. For traditional crops such as maize, informal sources of knowledge were more important. For cash crops and new crops, formal sources of knowledge were more relied upon. This is because of the commodity-specific extension that NASAFAM used to accompany cash crop production to ensure adequate quantity and quality for the market. Hence combinations of formal (extension) and informal (parents and neighbours) sources of knowledge were deemed important. This suggests a learning curve whereby formal sources dominate the early stages of introduction of a new crop or promotion of an improved variety but during later stages, the informal sources take over as some farmers within the society become experts on such crops. This is an empirical issue that requires longitudinal tracking to establish the facts.

### *Seed preservation and storage*

A combination of traditional and modern methods for seed preservation and storage were utilised. The former was more utilised in Karonga and the latter in Thyolo. In both sites, women were very important in seed storage. Although men dominated decision-making on what crops and varieties to be produced for food and cash income, higher proportions of women held the responsibility for seed storage. In HIV/AIDS-infected households, more women than men were responsible for seed storage.

### *Seed knowledge transfer*

Both formal and informal channels of seed knowledge transfer were utilised. Grandparents and parents were the common inter-generational sources of seed knowledge while extension and neighbours dominated the intra-generational sources. There were three types of pathways through which seed information was passed on to children: involvement of children in seed management activities, parents teaching their children; and by children learning about seed management in school although these played a minimal role. These pathways were similar to those in households infected by HIV/AIDS. Generally inter-generational knowledge transfer was to the largest extent based on interaction between parents and children. The challenge lies in the fact that if parents are chronically ill or succumb to early deaths due to HIV/AIDS, children will increasingly lack the older generation that should teach them by doing. In fact minimal proportions. In some cases well over 80% of households did not report knowledge transfer by the chronically ill members. In the few cases where the converse was true, both the girl and boy child was targeted. Knowledge was transferred to more girl children in the matrilineal societies while the converse was the case in patrilineal societies. Cases of knowledge transfer to grandchildren show the important role of the elderly in transmission of knowledge mainly to orphans.

### *Institutions and seed knowledge transfer*

Meso-level institutions intervening in situations of HIV/AIDS run a broad portfolio of activities ranging from food security, relief and nutrition through natural resources management, income generation, technology development to mitigating impacts of HIV/AIDS and gender inclusiveness. Both research and development are addressed.

However, over 70% of study households belonged to farmers' clubs, mostly those backstopped by NASFAM. A key finding was that over 80% of study households reported not to have gained seed knowledge from these organisations. Clearly, these types of intervening organisations did not have a significant impact on the vulnerable households in so far as seed knowledge is concerned. However, the few benefiting households reported to have gained some knowledge on seed selection and management.

In addition, these institutions focused on the transfer of knowledge within generations. Strategies such as formal extension and farmer-to-farmer extension were utilised to teach farmers on crop varieties and their performance and in the distribution of farm inputs such as seed and fertiliser. Clarity is lacking on how the potential of these organisations could be harnessed for inter-generational seed knowledge transfer.

## 7. Policy recommendations

- (i) Since men dominated household headship in spite of the inheritance structure, and because of high proportions of households headed by women especially in matrilineal societies, gender mainstreaming in intervening programmes is recommended. This is further supported by the fact that knowledge transfer pathways favoured the girl child in matrilineal societies and the boy child in patrilineal areas. It is further supported by the fact that women headed most households infected by HIV/AIDS. They made most investment decisions regarding crops and varieties to be grown. And they held the greater responsibility for seed selection, preservation and storage.
- (ii) HIV/AIDS-infected households had the lowest far and non-farm incomes. They also had lower land holding sizes and relatively larger household sizes. Inter-generational seed knowledge transfer in these households depended a lot on interaction between parents and children. The greatest challenge for these households lies in the fact that if parents are chronically ill or succumb to early deaths due to HIV/AIDS, children will increasingly lack the older generation that should teach them by doing. These households therefore form a special category of vulnerability that requires specific targeting by research and development.
- (iii) Households infected by HIV/AIDS were diversifying their crops beyond the usual chilies, rice and pigeonpea into horticulture. This is an important entry point for the promotion of nutrition gardens for such vulnerable households. Promotion of such technologies ought to be accompanied by transfer of germplasm and seed knowledge.
- (iv) The study did not establish impacts of HIV/AIDS on households' capability to continue growing certain crops and varieties and not others. More research is required particularly the longitudinal monitoring of HIV/AIDS-infected households to discern such changes in crop diversity and the drivers of change so as to inform policy accordingly.
- (v) Combinations of formal (extension) and informal (parents and neighbours) sources of seed knowledge were utilised to varying extents depending on whether or not the crop or variety in question was modern. This suggests a learning curve whereby formal sources dominate the early stages of introduction of a new crop or promotion of a modern variety but during later stages, the informal sources take over as some farmers within the society become experts on such crops. This is an empirical issue that requires longitudinal tracking to establish the facts as an input into technology targeting processes.
- (vi) The important roles played by grandparents in the transfer of seed knowledge and information highlights the significance of the elderly in bridging the gap left by the "missing" generation of prime-age adults due to HIV/AIDS. This is supported by the fact that over 80% of the chronically ill did not transfer seed

knowledge to their children. More research is required to establish how best this category of elderly households can be targeted within seed systems.

- (vi) Although there were many meso-level organisations intervening in situations of HIV/AIDS, well four fifths of study households reported not to have gained seed knowledge from these organisations. For those that did, they only benefited from intra-generational knowledge transfer mechanisms used by these organisations. But the increasing numbers of orphans taken care of by the elderly and other extended family relations require inter-generational methods. This is supported by the fact that proportions of child-headed households were negligible. The potential of these organisations ought to be harnessed for inter-generational seed knowledge transfer.

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