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**International Crops Research Institute for the Semi-Arid Tropics**

**MOZAMBIQUE**

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**RESEARCH REPORT**

**The impact of HIV/AIDS on farmers' knowledge of seed:  
Case study of Chókwè District, Gaza Province, Mozambique**

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# RESEARCH REPORT

## **The impact of HIV/AIDS on farmers' knowledge of seed: Case study of Chókwè District, Gaza Province, Mozambique**

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## **Abstract**

HIV/AIDS has a negative impact on all the key factors that facilitate access to local and new knowledge around seed and seed management, including local capacity for seed conservation, access to labor and land. Women, the principal keepers of this knowledge are particularly vulnerable to these impacts. Based on fieldwork carried out in Chókwè District of Gaza Province, southern Mozambique, this study reveals that female-headed households have a significantly smaller area of cultivated land, plant fewer crops and have access to less family labor. These factors all relate to seed security, suggesting that female-headed households are less seed secure than male-headed households. However, it is difficult to determine whether this is caused by poverty (female-headed households are likely to be poorer than male-headed households) or the impact of HIV/AIDS. Statistical analysis of the data collected suggests that HIV/AIDS affected households, especially those households caring for orphans, experienced constraints in access to seed and seed information. These issues should be addressed urgently before the erosion of local knowledge undermines seed security and thereby food security. New agricultural projects, especially those relating to seed, should be formulated to target and relieve some of the farm level constraints faced by HIV/AIDS affected households, especially those households caring for orphans and female-headed households.

## Acronyms

|         |  |
|---------|--|
| AIDS    | Acquired Immune Deficiency Syndrome  |
| AHH     | Affected households  |
| DDWSA   | District Directorate for Women and Co-ordination of Social Action  |
| DINA    | [National Directorate of Agriculture] in the Ministry of Agriculture and Rural Development, Maputo, Mozambique           |
| DNM     | [National Directorate of Women's Affairs] of the Ministry of Women and Coordination of Social Action, Maputo, Mozambique |
| DPADR   | [Provincial Directorate of Agricultural and Rural Development]   |
| FAO     | Food and Agriculture Organization of the United Nations  |
| FEWSNET | Famine Early Warning System  |
| FHH     | Female-headed households   |
| HIV     | Human Immunodeficiency Virus   |
| ICRISAT | International Crops Research Institute for the Semi-Arid Tropics   |
| INIA    | [National Institute of Agronomic Research]   |
| MADER   | [Ministry of Agriculture and Rural Development], Maputo, Mozambique  |
| MMCAS   | [Ministry of Women and Co-ordination of Social Action], Maputo Mozambique  |
| MoH     | Ministry of Health, Maputo, Mozambique   |
| NAHH    | Non-affected households  |
| NGO     | Non-Governmental Organization  |
| PRA     | Participatory Rural Appraisal  |
| UCEA    | [Coordination Unit for Emergency in Agriculture]   |
| SARNET  | Southern Africa Root Crops Research Network  |
| SPSS    | Statistical Package for Social Sciences  |
| SSP     | Seed System Profiles   |
| STD     | Sexually transmitted disease   |

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# 1. Introduction

Food security for the vast majority of the mainly rural population<sup>1</sup> in Mozambique is underpinned by farmers' local knowledge around seed and seed management. Over the course of generations, farmers – particularly women, who play the key role in seed selection and conservation – have handed down knowledge of local seed varieties that they have gradually adapted to the prevailing agro-ecological conditions. This process is now under threat from a rapidly changing socio-economic environment and the impending crisis of HIV/AIDS.

With rapidly rising prevalence rates of HIV infection, Mozambique has yet to feel the full impact of AIDS in terms of morbidity and death. Already, however, it is widely acknowledged that in Southern Africa – the region worst hit by HIV/AIDS – the epidemic has serious implications for food security (see De Waal 2003).

Key components of food security are seed security and access to knowledge and information around seed. Historically, the transmission of knowledge and information about seeds and their management has followed a gendered pattern in Mozambique. Women are often the key source of local knowledge on seeds, especially in areas affected by male labor migration as in the south of the country (Young 1977; Isaacman 1996; Dominguez 2001). Yet, women's local knowledge – as well as their access to new information – has often been marginalized by formal sector interventions such as free seed distribution (Dava et al. 2001; Waterhouse 2002).

The HIV/AIDS epidemic itself tends to exacerbate gender inequalities (UNAIDS/UNGT 2003). These, in turn, contribute to weakening food security. Adapting seed system interventions in order to strengthen community resilience against the effects of the epidemic and other forms of crisis requires a deeper understanding of how the flow of information and knowledge on seeds and seed management functions in practice.

Based on the results of fieldwork carried out in Chókwe District of Gaza Province, southern Mozambique, this report looks at the content and significance of local knowledge around seeds and seed management and at local processes of transmitting this knowledge<sup>2</sup>. It seeks to investigate the likely impact of HIV/AIDS on these processes.

It is, however, impossible to investigate the precise impact of HIV/AIDS on knowledge flows for a number of reasons:

- The lack of systematic information regarding changes in local knowledge.
- The lack of clinical information regarding people living with HIV/AIDS or AIDS-related deaths.
- The strong social stigma still associated with AIDS.
- The fact that the full impact of mortality due to AIDS in southern Mozambique is still to come.

Instead, proxy indicators were used to investigate the impact of the epidemic on agricultural practice and knowledge flows for households suffering demographic changes associated with HIV/AIDS such as:

- long-term, terminal illness
- early death of young adults
- caring for orphans.

The impact of these phenomena gives an indication of the likely impact of HIV/AIDS.

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<sup>1</sup> Some 70% of the estimated 18 million population are classified as rural, according to Government statistics.

<sup>2</sup> Knowledge flows refers here to the transmission of knowledge, which occurs between individuals. This is affected by changes in the knowledge base as well as socio-economic changes such as access to information through the media and through market channels.

## 2. Rationale for the study

### Local seed systems and traditional knowledge

Mozambique is a climatically diverse country located in Southern Africa and bordered to the east by the Indian Ocean. Several rivers bisect the country from west to east, providing rich alluvial soil in the flood plains. Agricultural production is a key feature of the economy, in a country where some 70% of the estimated population of 18 million is classified as rural (GOM 2001).

The predominant system of rainfed crop production is precarious, particularly in the southern part of the country (Maputo, Gaza and Inhambane Provinces). This zone is semi-arid and has an average rainfall of less than 600 mm (Dominguez and Jones 2003:1). Drought and floods are cyclical.

Over 90% of agricultural producers are found in the small-scale 'family sector', reliant mainly on family labor (INE 2002). The majority of small-scale producers are women<sup>3</sup>. Women perform the bulk of agricultural labor in producing food for family consumption. In addition, they contribute labor to the production of crops for the domestic and export markets. Most farmers in the family sector – or 71% of the rural population – are said to live in absolute poverty.

The vast majority of small-scale farmers base their production on seed sourced through informal channels, often referred to as the 'local seed system'. According to Dominguez and Jones (2003):

“This system encompasses all activities from production through to utilization including seed exchange that is not controlled by formal institutions either public or private”.

They argue that the main characteristics of local seed systems are that farmers produce, select and store seed principally for their own use and that seed production is almost always an integral part of crop production – whether for food or other purposes (ibid). ‘Seed’ in this case refers to “any plant part which can reproduce the same kind of crop” (Musa 1998).

The maintenance of these systems depends on acquiring and transmitting knowledge on seeds and seed management from one generation to the next. Local knowledge about seeds and seed management has traditionally been a key factor in food security at household and community levels (Dominguez and Jones 2003).

Given the gendered division of labor and social roles in which women bear the prime responsibility for food production and processing (both in Mozambique and throughout Southern Africa), women have traditionally been the main font of local knowledge on seed selection, conditioning and storage. Women have been the principal managers of crop and seed diversity in relation to food crops (Musa 1998; Dava et al. 2001; ICRISAT 2003). These factors suggest that gender relations have an important bearing on seed knowledge and information flows.

Musa points out that local seed systems directly reflect the way in which, over many generations, farmers have adapted their agricultural practice to the prevailing agro-ecological and social environment:

“That informal seed provision systems are resilient to environmental changes... is evidenced by the observation that they still contribute an estimated 90 percent of all seed used for food production in developing countries” (Musa 1998, citing Almekinders et al. 1994).

Nonetheless, there are serious weaknesses in local seed systems. These are exacerbated by economic changes, natural disasters and poor information management, often affecting women and men differently. To these factors must now be added the threat of HIV/AIDS.

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<sup>3</sup> Approximately 66% of men and 95% of women respondents to the last population census (1997) stated agriculture to be their main economic activity (INE 1999).

## Weakening resilience?

The development of farming practices and social organization in Mozambique in many ways reflects the ecological environment. In agriculture, for example, farmers tend to plant a wide diversity of crops and crop varieties in order to take advantage of different soil types, moisture regimes, vegetation and topography (Musa 1998; Longley 2000). This strategy enables farmers to minimize risk against crop failure.

Social organization has followed a similar pattern. Feliciano (1998) suggests that the key features of pre-colonial economic organization among the Tsonga people of southern Mozambique were a diversity of productive activities, dispersed settlement (to make optimum use of diverse resources) and social institutions – such as marriage – which ensured the circulation of people and food between different ecological zones. In relation to the early 20th century, Manghezi (1983) further describes how rural producers in southern Mozambique would draw on kinship ties through the practice of *kuthekela* (solidarity) to access food and seeds from different ecological niches.

Yet, recent research suggests that traditional mechanisms for ensuring seed security are in decline. In their study of Xai-Xai District of Gaza Province, for example, Dava et al. note that the key traditional forms of seed acquisition were: *kuhlaisa* (conservation); *kuthekela* (solidarity), whereby someone may be offered seed in the expectation they will reciprocate in future; and *kurimela* (labor), where the compensation for labor may be in the form of seeds. They found that these practices are declining and argue that key contributing factors include the civil war from 1976-1992, related decline in production levels, and the recent advent of a liberalized market economy (Dava et al. 2001).

By contrast, Dava et al. (2001) found an increased dependence on donations (by NGOs or Government emergency seed aid projects) and on the market for seed acquisition.

The same study notes that women are more engaged than men in subsistence crop production for home consumption and have less control over cash than men. Given their relatively weaker access to the market, this suggests that a decline in traditional seed sourcing mechanisms in favor of the market has negative implications for women.

Natural disaster has also had a negative impact on local seed systems. Following severe floods in the Limpopo river basin in 2000, for example, the majority of local farmers resorted to seed purchase or donations (ICRISAT 2002). Over the last decade there has been repeated distribution of free seed supplied from outside the country, in response to wartime disruption as well as droughts and floods. There is growing concern that this is increasing farmers' dependency on external sources of seed – with negative implications for the resilience of local seed systems (Dominguez and Jones 2003). Not least, such resilience may be undermined through the eroding effect of external dependence on local knowledge. The resilience of local seed systems, and the knowledge they depend upon, is now further threatened by the impending crisis of HIV/AIDS.

## The challenge of HIV/AIDS

Mozambique is yet to feel the full impact of the HIV/AIDS epidemic. Already, it counts among the 10 most affected countries in the world by HIV/AIDS; yet prevalence rates are still rising dramatically. The Food and Agricultural Organization of the United Nations (FAO) predicts that between 1985 and 2020 Mozambique will lose over 20% of its agricultural labor force to HIV/AIDS. It further predicts the demographic profile will alter radically, as the 15-49 year old age group thins out and average life expectancy declines (Jayne et al. 2003).

Paradoxically, though many people lost their lives in the conflict, civil war in Mozambique impeded the spread of HIV/AIDS. Insecurity throughout the countryside, disrupted communications and the massive displacement of rural people who sought refuge outside the country left many areas highly isolated during the war; and, thereby, less vulnerable to the spread of HIV/AIDS.

Since the first case of AIDS was notified in 1986, however, HIV infection rates have soared to reach 13.6% of adults between 15-49 years of age by 2002 (MoH). More than 1.3 million people are thought to be living with HIV/AIDS, of whom approximately 10% are children infected by mother-to-child transmission. Over 600,000 children have already been orphaned by AIDS (Della-Vedova 2003, citing Ministry of Health data).

A number of factors have shaped the spread of the HIV/AIDS epidemic. The extremely high levels and prevalence of poverty in Mozambique have increased vulnerability to HIV/AIDS, through low health and nutritional status, poor education and economic dependence. These factors are reflected in, and intensified by, gender inequality and high levels of population mobility (Oxfam 2003).

Gender inequality increases vulnerability of both men and women, partly through a concept of masculinity that encourages high-risk behavior through multiple partners or sexual aggression, through women's economic dependence on men, and a concept of femininity that encourages submission (Save the Children/ACORD/ActionAid 1997). The worst impact of inequality falls on women. This is partly because women are physiologically and socially more vulnerable to infection. Nearly 57% of Mozambican adults (15-49) living with HIV/AIDS are women. The gender disparity is most striking in the 20-24 year age group, where women with HIV outnumber men by 4 to 1 (UNFPA 2002). Furthermore, as the principal caregivers in society, the increased burden of care for the sick and the dying as well as for orphans falls mainly upon women.

High levels of population mobility have influenced the epidemic. A long history of labor migration from Mozambique to neighboring countries took on new dimensions during the war: almost one third of the national population was displaced from their homes and many people sought refuge across the border. Post war resettlement and continued movement between Mozambique and the Southern Africa region, which has among the highest HIV prevalence rates in the world fuelled the epidemic. As migrant workers move back and forth to neighboring countries, families are separated and sexual networking tends to be extensive, increasing the risk of HIV transmission (OCAA, 2003).

HIV prevalence is higher in the central and southern regions of the country. The average prevalence in southern Mozambique was 15% in 2000, whilst Gaza Province – with probably the highest levels of labor migration - showed a prevalence of over 16% the same year.

So far, there is only scanty research into the impact of HIV/AIDS on agricultural practices in Mozambique. Nonetheless, there are already clear indications that this epidemic will have a severe negative impact on local knowledge retention related to agricultural practices and on household food security. This danger is intensified by gender inequalities, since women are the key retainers of local agricultural knowledge and yet they are worst affected by HIV/AIDS.

### 3. Methodology

The research reported here took the form of a case study designed to increase understanding of the sources, access, transmission and constraints to knowledge and information flows on seed and seed management among smallholder rural producers in Chókwè. The study sought to assess the likely impact of HIV/AIDS on knowledge and information flows, and on the retention of traditional knowledge around seeds and seed management. It aimed to identify the gender and poverty dimensions of these processes.

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) carried out the field research in Chókwè District of Gaza Province in southern Mozambique, between September and November 2003. It received support from the National Institute for Agronomic Research (INIA) and the National Directorate of Agriculture (DINA) in the Ministry of Agriculture and Rural Development (MADER), from the National Directorate of Women's Affairs (DNM) of the Ministry of Women and Co-ordination of Social Action (MMCAS) and from FAO through its LinKS project from which this research has been co-funded. The FAO-LinKS project works to improve rural people's food security and promote the sustainable management of agro-biodiversity by strengthening the capacity of institutions to use participatory approaches that recognize men and women farmer's knowledge in their programmes and policies. The LinKS project has three main activity areas, which are capacity building and training, research and communication and advocacy. The project is funded by the Government of Norway.<sup>4</sup>

This section presents the key conceptual definitions used for this research, the case study location and the field research process.

#### Definitions

*Local knowledge* is an elusive concept. Similarly, the notions of *local seed systems* or *local varieties* are difficult to define clearly. Tripp points out that:

“It is often difficult to make an absolute distinction between local and formal seed systems.... as seed becomes a traded commodity it is difficult to separate the ‘local’ from the ‘formal’” (Tripp 2001:45).

For the purpose of this study, *local knowledge* is taken to mean knowledge of seed varieties and management practices held as *traditional* (i.e. with a long history) in the case study communities. These varieties and practices were identified through group and individual interviews in the community.

As the study revealed, however, oral records of traditional knowledge may obscure a considerable degree of change and adaptation that has taken place within apparently static systems. This presents considerable limitations in tracing the history of local knowledge. This is further complicated both by the dispersed and fluid nature of local knowledge and by the use of different nomenclature.

*Farmer variety* or *local variety* is used to refer to seed that local farmers themselves distinguish as different from other varieties for the same crop, whether or not this is based on actual genetic differences<sup>5</sup>. For instance, in the case of groundnuts many respondents in Chókwè referred to a ‘small red’ and a ‘large white’ seed. These are taken to be *farmer varieties* because local farmers themselves classify them separately, even though we did not gather evidence as to whether or not they are genetically different.

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<sup>4</sup> For more information, please see website: [www.fao.org/sd/links](http://www.fao.org/sd/links)

<sup>5</sup> In a recent study of seed diversity in Chókwè, Ferguson (2002) has shown that the names of seed types with different morphological characteristics do not accurately reflect genetic diversity. In some cases, seeds with the same name have a widely differing genetic composition whilst, in other cases, seeds with different names have closely matching genetic properties.

The case study has sought to understand how gender difference affects seed knowledge and information flows. *Gender* signifies a social relationship between women and men, established through social norms that attribute different characteristics, roles, rights and responsibilities to women and men. It is reinforced through economic relationships where women and men have different labor obligations, resources, and benefits. In Mozambique, women and men play significantly different roles in seed selection and management. This suggests it is important to investigate the differential impact of HIV/AIDS on women and on men and the implications of this for knowledge flows around seed.

The case study seeks to investigate the likely impact of HIV/AIDS on seed knowledge and information flows. Yet, the lack of medical and statistical information, as well as the issue of strong socio-cultural taboos around open discussion of HIV/AIDS, makes it impossible to classify rural households in Chókwè into those directly affected and not directly affected by HIV/AIDS. A proxy was used in the form of household types reflecting the typical demographic impact of HIV/AIDS.

Key features of HIV/AIDS that distinguishes it from other epidemic diseases are that it impacts most heavily on the economically active age group<sup>6</sup> of the population and that it affects sexual partners. The results include significant labor loss to the household and the likelihood that orphans will be left behind. For the purposes of the study two groups were considered:

1. Affected households (AHH): those caring for the terminally ill, caring for orphans, or headed by widows or widowers.
2. Non-affected households (NAHH): other households that do not have these features.

## Identifying the case study area

Chókwè District was selected for the study due to its agro-ecological features and demography as well as relative vulnerability of the local population to HIV/AIDS, as illustrated below.

Chókwè is located in the interior of Gaza Province, bordering with Massingir District in the northwest which borders South Africa. This area lies within the semi-arid south of the country and is prone to cyclical drought, especially in the upland regions. On the other hand, the Limpopo River – the main hydrographic resource of southern Mozambique – runs the length of the District. The lowland areas have rich alluvial soils combined with a propensity to flooding (FEWSNET 2001:4). Recent climatic events include the severe floods of 2000 followed by a prolonged drought still affecting the District at the time of the field research.

These repetitive natural disasters have shaped the development of the local seed system. HIV/AIDS can be seen as another ‘additional challenge’ and with its own dynamics, likely to test this system to the limits.

The district population was an estimated 207,175 inhabitants in 2000 (INE 2000). Health Department estimates suggest there are approximately 100,000 men and 130,000 women living in Chókwè.

FEWSNET notes that the large gap in the gender ratio relates to a long historical trend of male labor migration from the Limpopo area to South Africa. This is particularly notable in the 20-24 year age group where women outnumber men by almost 2 to 1 (FEWSNET 2001: 41). Typically, older migrants have returned to Mozambique once they retire or are no longer able to secure a contract. Nonetheless, the Limpopo basin has a predominantly youthful population with some 44% of inhabitants being under 15 years old (FEWSNET 2001: 41).

Population mobility has been associated with increased vulnerability to HIV/AIDS. Prevalence rates in Chókwè are exceptionally high for the south of the country, reaching 22% of the adult population in 2002 (MoH 2003). According to the District Administrator: “Chókwè is a type of warehouse and the town is a reference zone for the whole of northern Gaza. There is a lot of cross border movement, especially from Zimbabwe, and it is this constant movement of people that gives Chókwè one of the highest prevalence rates in the south” (Interview with António Mandlate, District Administrator, Chókwè, September 2003).

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<sup>6</sup> The Ministry of Health in Mozambique has defined this as 15-49 years old and adult HIV prevalence rates are calculated according to this age group.

Whilst the threat to local knowledge may be sharper here than elsewhere in the south, the findings from Chókwè are likely to be relevant for other rural areas in southern Mozambique and beyond, where HIV prevalence rates are high and rising.

## Field research process

Fieldwork for the case study was conducted in Chókwè District between early September and early November 2003<sup>7</sup>. Preliminary interviews with key informants were conducted in Chókwè town; including Government officials and the representatives of locally based Non-Governmental Organizations (NGOs) involved either in agriculture or in HIV/AIDS prevention and mitigation.

Detailed research was conducted in three villages, Thlawene, Maxinhe and Massavasse, selected to reflect the three principal agro-ecological environments within Chókwè District. These include: mainly rainfed cultivation (Thlawene village), combined rainfed cultivation on the uplands and access to the Limpopo river basin (Maxinhe), and cultivation within the Limpopo irrigation scheme (Massavasse)<sup>8</sup>. The population of these communities is relatively small, having less than 200 households in Thlawene, some 500 households in Maxinhe and 1175 in Massavasse (ICRISAT/District Administration of Chókwè 2003).

Chókwè District has particularly high prevalence rates for HIV/AIDS, but there is no breakdown of figures available within the District. Therefore it was not possible to actively select communities for a comparison between areas of low and high incidence. However, research findings did show a sharp variation between the three communities in terms of the current impact of HIV/AIDS. There was no obvious explanation for this. Given the small size of population and the very recent nature of the epidemic, this variation may be simply a question of where HIV/AIDS has happened to hit first.

Data collection was mainly based on qualitative research methods. These included interviews with key informants; Participatory Rural Appraisal (PRA) techniques at community level (including semi-structured interviews with focus groups, time lines, community mapping, wealth ranking, and prioritization exercises); and individual interviews with 90 people representing different households within the three rural communities. An outline of the PRA exercise and guidelines for semi-structured interviews are presented in Annex 1.

The PRAs provided an overview of local history with regard to agricultural practices as well as the current socio-economic context in each community. Separate focus group discussions were held with women and with men, divided into two groups according to elder and younger generations. This was in order to capture the relative experience of each generation. Local people defined adults of the younger generation as those under 45 years of age and those of the elder generation (grandparents) as 45 years and over. People interviewed individually were similarly classified into elder or younger generation. Comparison between the two groups and their relative knowledge of farmer varieties and management practices provides an indication of knowledge transfer from one generation to the next.

Through the PRA local people were asked to identify wealth indicators and these were used to define categories for wealth ranking. These indicators varied between the three villages. In Thlawene and Maxinhe, for instance, someone with more than five hectares of land was considered rich, but in Massavasse where there is a distribution of irrigated plots, households were only considered rich when they had more than 16 hectares. On the other hand, cattle are seen as a key indicator of wealth in Thlawene and Maxinhe but not in Massavasse where cattle keeping is officially limited to four animals.

To control for different indicators between villages, a set of six indicators were selected for each wealth group (locally identified as 'rich', 'middle' and 'poor'). A household would have to satisfy a minimum of

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<sup>7</sup> The research was carried out by Dr Rachel Waterhouse, Lead Scientist for the project and three local Research Assistants: Milly Devji BSc (Agronomist), Deborah de Carvalho (representing the DNM) and Cerejeira dos Santos Tinga (final year student, Arts Faculty, University of Eduardo, Mondlane).

<sup>8</sup> An irrigation system located in the middle of the district makes it one of the more important potential areas for agriculture in Mozambique. However, the system is working behind ¼ of the total capacity. The main dam and the irrigation and drainage channels are under rehabilitation.

four indicators to be classified within the respective wealth group. These indicators are presented in Table 1 below:

| Rich                     | Middle                   | Poor                   |
|--------------------------|--------------------------|------------------------|
| 25+ cattle               | Up to 25 cattle          | No cattle              |
| Plough                   | Plough                   | No plough              |
| Brick house              | Wooden hut/zinc roof     | Hut with straw roof    |
| Hire labor, paid in cash | Hire labor, paid in kind | Do not hire labor      |
| Motorized transport      | Non-motorized transport  | No means of transport  |
| Cultivate 16ha+          | Cultivate 1 – 16 ha      | Cultivate 1 ha or less |

The PRA exercises were used to gain a general overview of seed information and knowledge flows at community level, including gender differences and impediments to seed knowledge and information flows.

To better understand how local seed knowledge has been transmitted, adapted or lost, the Research Team sought to trace changes in the farmer varieties used, the mechanisms for obtaining seed, and techniques for selecting and storing seeds. The incidence of natural disaster tends to intensify such changes. Tracing the cyclical history of natural disasters in each community helped to identify how local farmers – as well as other stakeholders – have responded to crises and how this response impacts on seed knowledge and information.

Data collected through the PRA exercise set the context for semi-structured individual interviews. These were used to gather detailed information and personal experience around traditional seed knowledge and knowledge transfer. An average of 30 individual interviews were conducted in each community. Of these, 20 interviewees were selected by ‘snowballing’ technique (by walking from field to field or from house to house) and 10 interviews were specifically directed to *affected households* (AHH). The research team opted to interview a higher proportion of women than men (roughly 2:1), given their predominant participation in agriculture in these communities. In all, individual interviews were conducted with 64 women and 26 men.

Individual interviews provided qualitative information on the personal experience of interviewees. They were also used to extract quantitative information regarding the number of crops and farmer varieties used by different categories of household as well as variations in access to different sources of information on seed. This data was analyzed using the SPSS programme (Statistical Package for Social Sciences).

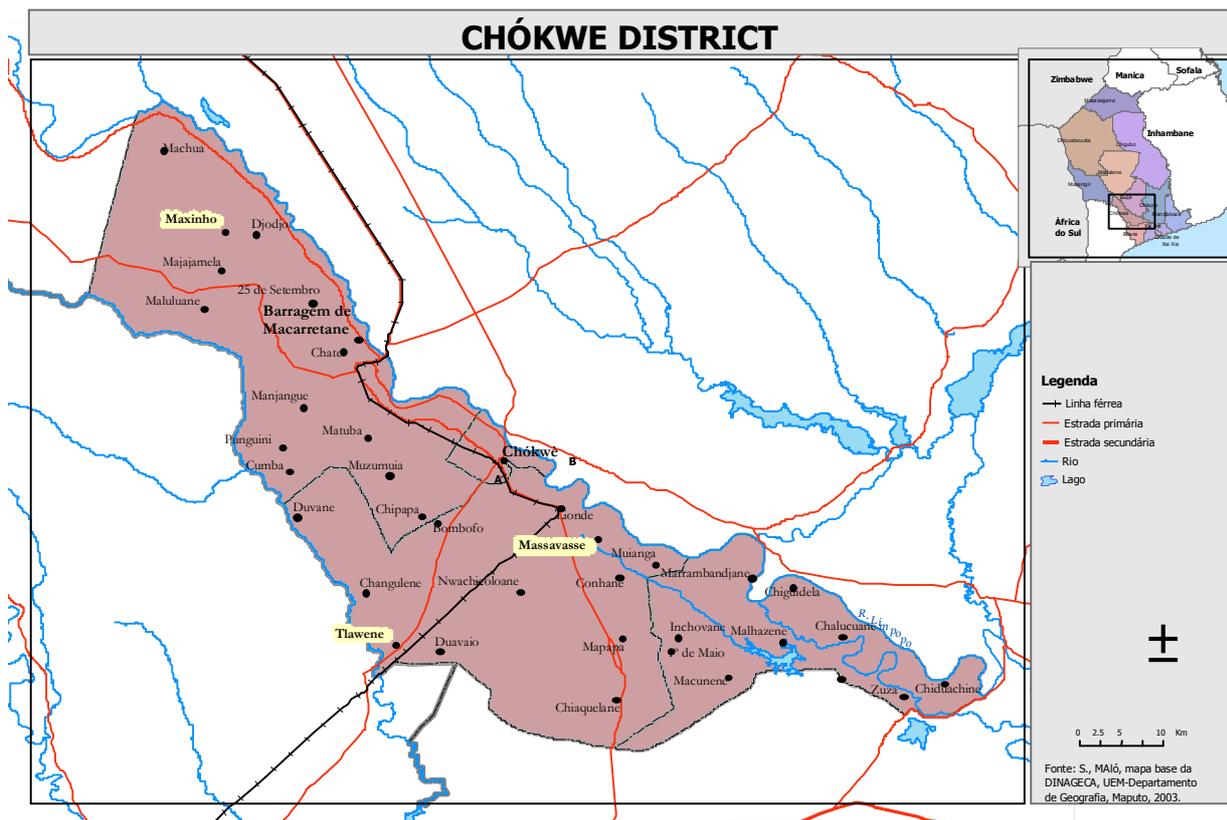
Results from the fieldwork were presented for verification and debate to local informants including community representatives at a workshop in Chókwè town, on 26<sup>th</sup> November 2003. A further workshop to present and debate the research findings with policy and decision-makers in the capital of Maputo was held in February 2004. Key comments of this consultation have been integrated in this report and in its recommendations (see Workshop Reports in Annex 2).

## 4. HIV/AIDS in Chókwè District

### Context

Agriculture is a key resource for the majority of Chókwè District inhabitants. Some 79% of the District population state subsistence agriculture as their main economic activity. However, this figure hides the high proportion of households relying on remittances from migrants, often working in South Africa or in Maputo, the capital of Mozambique (FEWSNET 2003).

Agro-ecological conditions are varied within the District. Chókwè is classified within the Food Economy Zone<sup>9</sup> of the lower Limpopo River Basin Complex. This includes the sub-zones of lower (*baixo*) areas close to the river where Massavasse and Maxinho are located, and higher (*alto*) areas farther away where Thlawene is located (see map below). FEWSNET reports that some 80% of the Chókwè District population lives in the upland region and 20% in lowland region which has a higher population density (FEWSNET/FEG/MADER/MoH 2001).<sup>10</sup>



<sup>9</sup> “Household Food Economy Analysis is a method for assessing food security and understanding rural livelihoods. The method is based upon developing an understanding of the various options people employ to secure access to food”, going beyond production based assessments to include other sources of food. Food economy zone relates to geographical determinants of key food economy differences. (FEWSNET/FEG/MADER/MoH 2001:3).

<sup>10</sup> The Seed System Profile (SSP) of this district is available in Portuguese from ICRISAT- Mozambique (MADER/ICRISAT 2003) and contains a comprehensible information regarding political, social and agricultural aspects of this district.

Cultivation is geared first and foremost to meeting the requirements for household food consumption, although this varies according to the location. In Massavasse, the field research revealed far more evidence of commercially oriented agriculture than in the other villages studied – reflecting concerted Government intervention to promote commercial farming within the irrigation scheme.

In general, the local farming system has developed to withstand the impact of droughts and flood, through concurrent use of different plot locations and a diverse range of crops and crop varieties planted in two to three different seasons each year depending on the area. Sandy soils in the upland areas and the lack of access to irrigation mean that crops are vulnerable to drought. In the lowland areas, crops perform better due to more fertile soils, yet there is greater risk of flooding.

Apart from agriculture, important sources of income include remittances from migrant workers, firewood and charcoal production, fishing, trade and off-farm agricultural employment (FEWSNET 2003:51). Of these sources, remittances are the most significant: “Remittances from South Africa are a crucial source of income in this area, which has historically been the main source of [Mozambican] labor for the South African mines” (FEWSNET 2003: 72).

According to data collected by FEWSNET, on average households living in the upland sub-zone depend on remittances for some 40% of their income compared to 35% for households in the lowland sub-zone (FEWSNET 2003: 72). This contrasts with the relatively greater importance of commercial agriculture in the lowlands.

The social profile of people interviewed for the case study reflects these patterns, as shown in Table 2, below. Interviewees in Massavasse (located within the irrigation scheme) showed the highest percentage of rich and middle-income households. The gender ratio was also lower in Massavasse, with a higher percentage of female-headed households (FHH) encountered in Maxinhe and especially in Thalwene, as illustrated in Table 3 below.

**Table 2. Social profile of interviewees according to location**

| Site       | Gender |    |     |    | Social Class |   |        |    |      |    | Age      |    | Total |     |    |
|------------|--------|----|-----|----|--------------|---|--------|----|------|----|----------|----|-------|-----|----|
|            | Women  |    | Men |    | Rich         |   | Middle |    | Poor |    | under 45 |    |       | 45+ |    |
|            | No.    | %  | No. | %  | No.          | % | No.    | %  | No.  | %  | No.      | %  |       | No. | %  |
| Maxinhe    | 20     | 67 | 10  | 33 | 1            | 3 | 10     | 33 | 19   | 63 | 16       | 53 | 14    | 47  | 30 |
| Thalwene   | 26     | 84 | 5   | 16 | 1            | 3 | 8      | 26 | 22   | 71 | 20       | 65 | 11    | 35  | 31 |
| Massavasse | 18     | 62 | 11  | 38 | 2            | 7 | 12     | 41 | 15   | 52 | 12       | 42 | 17    | 58  | 29 |
| Total      | 64     | 71 | 26  | 28 | 4            | 4 | 30     | 33 | 56   | 62 | 48       | 53 | 42    | 47  | 90 |

The interdependence of different livelihood strategies has a significant influence on agricultural practice. For instance, with the high incidence of migrant labor, more labor intensive crops such as sorghum and millet have disappeared in favor of crops that are less tolerant to drought but less demanding of labor, such as maize (Young 1977; interviews in Chókwè 2003). This interdependence makes it particularly difficult to isolate the effects of HIV/AIDS on local agricultural practice and associated changes in knowledge.

The impact of migration is also reflected in local demography and in the gender division of labor and in local knowledge patterns.

In Maxinhe and Thlawene, residents suggested that up to half of households in the village are headed by women alone: either *de facto* – because the husband is away – or *de jure*, because they are widowed, divorced or single. This conforms to official statistics showing that some 40% of households in the south of

Mozambique are female headed. The Limpopo basin area has a population ratio of one man to two women in the 20-24 year age group (FEWSNET et al. 2003:41).

In the case study sample of 64 women interviewed individually, 38 were heading households alone (female-headed households). This is equivalent to 59% of the women interviewed and 42% of all households represented in the individual interview sample. This is illustrated in Table 3:

| Location   | Households interviewed | FHHs interviewed | FHHs % |
|------------|------------------------|------------------|--------|
| Maxinhe    | 30                     | 11               | 37     |
| Thlawene   | 31                     | 17               | 55     |
| Massavasse | 29                     | 10               | 34     |
| Total      | 90                     | 38               | 42     |

The interdependence of agriculture with other sources of income – and related gender inequality – is reflected in the relative poverty of households headed by women without economic contributions from an adult man. A comparison of women and men in the sample shows that women interviewed were far more likely than men to be classified as poor. This is illustrated in Table 4 and reflects the general experience of rural women in southern Mozambique.

| Social Class | Women |     | Men |     |
|--------------|-------|-----|-----|-----|
|              | No.   | %   | No. | %   |
| Rich         | 2     | 3   | 2   | 8   |
| Middle       | 16    | 25  | 14  | 54  |
| Poor         | 46    | 72  | 10  | 38  |
| Total        | 64    | 100 | 26  | 100 |

A long-term reduction in formal sector employment opportunities, especially in the South African mines, is challenging these livelihood patterns. An increasing number of migrants cross the border illegally in search of unregulated job opportunities. There is evidence to suggest that this has a negative impact on remittances.

Even when men are economically active in the rural areas, men and women often perform a different set of agricultural tasks. In general, men's labor input tends to be timely and short term, for example driving oxen to pull the plough or constructing the granary. This is compatible with short visits to the rural homestead in between long periods away from home. By contrast, women generally take care of the routine labor such as weeding, watering, harvesting, seed selection, food processing and other domestic duties.

Participants in the case study widely acknowledged that women play the key role in seed selection and management (Interviews in Chókwè 2003). Due to their predominant role in traditional agricultural production, women were said to have most knowledge and expertise in this area. This conforms to previous research in southern Mozambique indicating that women are the main keepers of traditional knowledge in agriculture (Dava et al. 2001; Dominguez 2001).

In a focus group interview with some 20 men in Maxinhe, the men agreed that seed selection is a woman's job. They claimed that most agricultural tasks are shared between women and men (except for growing sweet potato which is the women's domain). Yet, in a group interview with some 50 women from the same village, the women claimed that men only help with ploughing and transporting the crop home in

ox-drawn carts, after the harvest: “All the rest is up to the women, but the men are very insistent and they will demand that they want to see all the crop gathered in quickly!” one woman said.

Whilst women and men have a different perception of their own workload, they also prioritize different crops. Table 5 shows the ranking exercise with focus groups done in Thlawene with men and women from the elder generation (45+).

**Table 5. Ranking of preferred crops – Thlawene (normal year)**

| Crops        | Ranking |   |   |   |   |   |   |   |   |   |   |
|--------------|---------|---|---|---|---|---|---|---|---|---|---|
|              | 5       |   | 4 |   | 3 |   | 2 |   | 1 |   |   |
|              | M       | W | M | W | M | W | M | W | M | W |   |
| Maize        | ✓       | ✓ |   |   |   |   |   |   |   |   |   |
| Groundnut    |         |   |   |   |   |   | ✓ |   |   |   |   |
| Pumpkin      |         |   |   |   |   |   |   | ✓ |   |   |   |
| Cow pea      |         |   | ✓ |   |   |   |   |   |   |   |   |
| Butter beans |         |   |   | ✓ |   |   |   |   |   |   |   |
| Sweet potato |         |   |   |   |   |   | ✓ |   |   |   |   |
| Cassava      |         |   |   |   |   |   | ✓ |   |   |   |   |
| Sesame       |         |   |   |   | ✓ |   |   |   |   |   |   |
| Melon        |         |   |   |   |   |   |   |   |   |   | ✓ |

5- high preference 1- low preference

Men ranked maize, cowpea, sesame and groundnuts in declining order of importance. This selection corresponds with the main crops marketed when there is a surplus.

By contrast, women said the most important crops were maize, butter bean, sweet potato and cassava, pumpkin, and melon. They explained that their choice had to do with food value and a balanced diet. For example, they preferred pumpkin to groundnut because the leaves are edible as well as the fruit and “we don’t have to use groundnuts to make the sauce<sup>11</sup>, we can just use pumpkin leaves, if necessary”. They added, “it’s a luxury” to wait for groundnuts to mature, since these have a longer growth cycle.

## Profile of HIV/AIDS in Chókwè

Compared to elsewhere in southern Mozambique, Chókwè has particularly high and still rising HIV prevalence rates, estimated at 15.1% of the adult population of the district in 2000 and reaching 22% by 2002 (MoH 2003). Local sources suggest that the high vulnerability of local people to HIV/AIDS relates to Chókwè’s history as a key area for labor emigration to South Africa and its location along the Limpopo road and rail transport corridor – a key route for transit between Mozambique, South Africa and Zimbabwe.

The figures for clinically confirmed AIDS cases in Chókwè appear low, though rising; but are likely to reflect only people who have actually contracted HIV (see Table 6). There is still a strong cultural taboo against AIDS and few people go for testing.

<sup>11</sup> Traditional Mozambican cooking includes various dishes using groundnut flour mixed with meat, fish or leaves such as cassava, cowpea or pumpkin leaves to make a relish.

**Table 6. Clinically confirmed AIDS cases in Chókwe Jan-June 2002 compared with 2003.**

| HIV/AIDS patients | Clinically confirmed cases<br>Jan-June 2002 | Clinically confirmed cases<br>Jan-June 2003 |
|-------------------|---|---|
| Male              | 459   | 488   |
| Female            | 414   | 434   |
| Total             | 873   | 922   |

Source: MADER/ICRISAT 2003, citing District Directorate of Health - Chókwe

The increasing number of orphans in the District is meanwhile becoming a serious problem. According to local government officials, most orphans are living with their grandparents, especially children under five (Interviews with officials from the District Directorate of Health and District Directorate for Women and Co-ordination of Social Action (DDWSA), September 2003). In a joint program with the NGO Terre des Hommes, however, the DDWSA has identified 55 child-headed households in only six villages where they conducted this exercise.

Data pertaining to the incidence of HIV/AIDS are collected through the sentinel site at district level and it is not possible to determine prevalence levels at sub-district level. However, the field research revealed that HIV/AIDS is affecting all three communities of Maxinhe, Thlawene and Massavasse.

The epidemic is most visible in Maxinhe; where residents openly admit the disease is taking a heavy toll. In this community of little over 500 households (representing some 2250 people) the local health post registered 115 orphans between 2000 to September 2003. Simple observation in the village showed that many households are dealing directly with AIDS, visible in the skeletally thin and painfully weak men or women that, during the day, sit or lie outside the house. During the five days that the research team worked in Maxinhe, three deaths were reported.

In Maxinhe, AIDS is openly recognized as a problem although people say they do not know what they can do about it. In Massavasse, a community of over 5,000 people, the problem is less visible. Local residents tend to associate AIDS with migration to South Africa and cite a number of cases where migrant workers have returned only to die. One such case occurred on the second day of the fieldwork.

There is still a heavy taboo surrounding HIV/AIDS in Thlawene. Local people said they had heard about it, but in-group interviews denied it affects their community. Individual interviews strongly suggested otherwise. For instance, at least three people were interviewed from a household where both spouses were suffering from a long-term, debilitating illness. Meanwhile, two of the 11 widows interviewed in Thlawene said their husbands used to work in South Africa but committed suicide before coming home. Given the high incidence of HIV/AIDS among migrant workers and the related stigma, it seems likely there was an association.

The varying incidence of HIV/AIDS in the three study locations is partially reflected in the data on affected households (AHH). For reasons noted above, the number of AHH is not an accurate indication of AIDS affected households since all households affected by terminal illness, widowhood, and caring for orphans were included in this category. In relation to HIV/AIDS, the most pertinent indicator may be the percentage of households caring for orphans, since this indicates the premature death of both parents. This is a typical impact of HIV/AIDS not associated with other terminal illnesses. As can be seen in Table 7 below, Maxinhe had the highest number of households caring for orphans.

**Table 7. Profile of affected households interviewed, according to location**

| Location   | Widows interviewed |    | Households caring for terminally ill |    | Households caring for orphans |    | Total number of interviewees |
|------------|--------------------|----|--------------------------------------|----|-------------------------------|----|------------------------------|
|            | No.                | %  | No.                                  | %  | No.                           | %  |                              |
| Maxinhe    | 3                  | 10 | 5                                    | 17 | 15                            | 50 | 30                           |
| Thlawene   | 11                 | 36 | 4                                    | 13 | 10                            | 32 | 31                           |
| Massavasse | 5                  | 17 | 5                                    | 17 | 7                             | 24 | 29                           |
| Total      | 19                 | 21 | 14                                   | 16 | 32                            | 36 | 90                           |

Local initiatives to address the problem of HIV/AIDS in Chókwè have mainly focused on health care through technical or moralizing messages around HIV transmission and prevention, and on the treatment of opportunistic diseases.

## 5. Changing seed knowledge and management in Chókwè

Investigating the likely impact of HIV/AIDS on local knowledge around seeds presents a number of methodological difficulties, encountered during the course of this research. These problems revolve around:

- Identifying the content of local knowledge about seed and seed management.
- Tracing changes in local knowledge and knowledge flows.
- Assessing the likely impact of HIV/AIDS on an already fluid situation.

These issues are discussed in this section.

### Seed knowledge and seed management in Chókwè

#### Crop diversity

Local farming systems in the Limpopo river basin area are generally based on the principle of diversity, wherein farmers seek to balance their diet and minimize risk through producing a range of different crops and planting a variety of seed types.

Through planting different seed types, farmers seek to spread the labor burden as well as food availability throughout the year and hedge against the risk of variable climatic conditions. Long and short cycle beans and tubers, for example, mature at different times, spreading the work at harvest time and ensuring a steady supply of food. By planting different varieties of cereals and legumes, farmers may also seek to benefit from more productive but less hardy varieties, whilst hedging the risk with varieties that are less productive yet more tolerant to drought.

This practice is clearly reflected in the interview data, both at community and at individual level. Table 8 below, illustrates the range of different crops grown and farmer seed varieties cited by farmers in Maxinhe.

Interview data indicate that the majority of farmers grow a wide range of crops – even though they may only have two or less hectares of land.

**Table 8. Range of traditional crops and farmer seed varieties known in Maxinhe**

| Local name   | Name in English                    | No of traditional varieties known | No. of recently introduced varieties known |
|--------------|------------------------------------|-----------------------------------|--|
| Mavele       | Maize                              | 3                                 | 3  |
| Timbawene    | Cowpea                             | 7                                 |  |
| Tindlulu     | Groundnut                          | 7                                 |  |
| Timanga      | Pumpkin                            | 4                                 |  |
| Makwembe     | Watermelon                         | 3                                 |  |
| Kalavatla    | Sorghum                            | 4                                 |  |
| Machalane    | Cassava                            | 5                                 |  |
| Mtsumbula    | Sweet potato                       | 7                                 | 3  |
| Muthlata     | Sesame                             | 1                                 |  |
| Matobo       | Melon                              | 1                                 |  |
| Varaua       | Tomato (adapted from wild variety) | 1                                 |  |
| Tingolokotso | Bambara nuts                       | 1                                 |  |
| Tindoji      | Pigeonpea                          | 1                                 |  |
| Xicombe      | Mapira                             | 1                                 |  |
| Matimba      | Sugar cane                         | 1                                 |  |
| Mwauva       | Type of cane                       | 1                                 |  |
| Guruane      | Similar to melon                   | 1                                 |  |

The post-war resettlement period (dating from the Peace Accord to end civil war in 1992) was taken as a turning point in local history which is easy for everyone to remember. Interviewees were asked to identify which traditional crops they used to grow before this period “crops previously grown” and the total number of crops they currently grow. Table 9 shows that over 90% of interviewees grew more than 6 different crops and 31% grew more than 10 crops in the pre-resettlement period.

**Table 9. Number of crops grown by farmers over time**

|                          | Crops previously grown |        |      | Crops currently grown |      |      |
|--------------------------|------------------------|--------|------|-----------------------|------|------|
|                          | 5 or less              | 6 – 10 | > 10 | 5 or less             | 6-10 | > 10 |
| % of farmers interviewed | 10                     | 59     | 31   | 27                    | 39   | 34   |

The range of crops that farmers interviewed grow, however, has dropped in the last decade (see Table 9 above). The percentage of interviewees growing more than six different crops has dropped from 90% some 10 years ago to 73% at present, even though just over one third (34%) still grow more than 10 crops.

Comparison between age groups shows that interviewees from the elder generation (45 years old and over) have consistently cultivated a wider range of crops than those from the younger adult generation (18-44 years old). This is illustrated in Table 10 below.

**Table 10. Number of crops grown by farmers over time according to age group**

| Number of crops | Crops previously grown |                 | Crops currently grown |                 |
|-----------------|------------------------|-----------------|-----------------------|-----------------|
|                 | % of Adults <45        | % of Elders 45+ | % of Adults <45       | % of Elders 45+ |
| 1 - 5           | 12.6                   | 7.2             | 31.3                  | 14.3            |
| 6 - 10          | 68.8                   | 47.6            | 39.7                  | 37.9            |
| > 10            | 18.6                   | 45.2            | 29.0                  | 47.8            |

The fact that younger adults grow a narrower range of crops may be partially associated with loss of knowledge around traditional crops. Interviewees were asked to identify the number of traditional seed varieties they knew for the following crops: maize, rice, groundnut, cowpea, cassava and pumpkin. In all cases except cowpea, a higher percentage of younger than elder adults were unable to identify a single traditional variety. This is illustrated in Table 11 below.

**Table 11. Percentage of adults under 45 and elders (45+) unable to identify traditional varieties of seed**

| % of interviewees unable to identify any traditional variety | Maize | Rice | Groundnut | Pumpkin | Cassava | Cowpea |
|--|-------|------|-----------|---------|---------|--------|
| Under 45 age group   | 8%    | 13%  | 25%       | 27%     | 33%     | 10%    |
| 45 years and over  | 2%    | 5%   | 12%       | 10%     | 19%     | 12%    |

Women and men interviewees were asked to recall the range of traditional crops grown in their household in the pre-resettlement period<sup>12</sup>. Women cited a considerably wider range of traditional crops than men did, as shown in Table 12 below. This is likely to be related to the gendered division of labour, described in Section 4 above, and reflected in different levels of knowledge. Since women have historically been more directly involved in cultivation, especially of food crops for domestic consumption, it is not surprising that they have a wider knowledge of traditional crops.

**Table 12. Number of crops grown by male and female farmers over time**

| Number of crops | Crops previously grown (traditional) |          | Crops currently grown (traditional and recently introduced) |          |
|-----------------|--------------------------------------|----------|---|----------|
|                 | % of women                           | % of men | % of women  | % of men |
| 1 - 5           | 9.4                                  | 13.5     | 29.8  | 11.5     |
| 6 - 10          | 39.9                                 | 62.6     | 40.7  | 34.5     |
| > 10            | 50.7                                 | 23.9     | 29.5  | 54.0     |

Interviewees were also asked to identify the range of crops currently grown, including traditional and recently introduced crops. In this case, men cited a wider range of crops than women. This seems to suggest

<sup>12</sup> The percentage of women and men refers to the number of crops that women and men identify as those being grown by their household. This does not imply that women and men work separate plots. As noted above, women and men tend to work the same plots, but have different tasks; though women are more –sometimes exclusively – involved in growing specific crops, such as sweet potato. These figures therefore do not reflect different activities of women and men, but different levels of knowledge.

that men have better access than women do to information on new crops. This is substantiated by analysis of the data on access to information: see Table 15 below.

It may further suggest that households including an economically active couple have been more able than those headed by women alone to maintain a range of crops in the face of droughts and the flood affecting Chókwè in the last 10 years. It is worth noting that among our sample, female-headed households (FHH) were more likely to be poor (71% of FHHs) than those where a couple lived together (54% were poor).

The exception to the practice of diversity in smallholder agriculture is within the irrigation scheme. Here, the Government has discouraged a wide range of crops and farmer seed varieties in favor of growing rice as a uniform commercial cash crop, with maize and vegetables as secondary off-season crops. Farmers interviewed in Massavasse practiced a less diverse range of crops and farmer seed varieties compared to Maxinhe and Thlawene. Even in terms of rice, local farmer varieties grown before the irrigation scheme was placed under state management (1975) have since been almost entirely replaced by new commercial varieties

## Seed selection, conservation and treatment

In the vast majority of cases, small-scale farmers prefer to conserve their own seed for the next season, whenever conditions allow. This requires a body of local knowledge on seed selection and conservation that has been built up and adapted over the years and passed down from one generation to the next (ICRISAT 2003). Through group interviews in the three case study locations, participants described the process of seed selection, conservation and treatment.

Interviewees explained that seed selection of cereals, pulses and legumes is carried out at the homestead after the crop has been harvested. Women select the seed. This occurs in two or three phases. First, they separate the cobs, seedpods or panicles into those for consumption and those that may be used for seed. These are selected according to visible signs of damage by pest or disease and the undamaged material is set aside for seeds. Plant material that looks particularly healthy, for example according to color or size, may also be selected for seed.

Second, when the grain is dehusked or shelled, women separate the grains again into that for consumption or other use, and that suitable for seed. The same principles of selection are used with undamaged and healthy looking grain being set aside for seed. Some women said they also look for germinative potential according to coloration of the 'eye' of the seed. According to interviewees, 'off-types' (grains that differ in appearance from the typical seed type) are discarded: in other words, farmers select for homogeneity of the local variety. Diversity is achieved by sowing different farmer seed varieties. In the case of roots or tubers, these are selected at the time of harvesting: healthy looking offshoots are selected for immediate replanting.

Third, the same selection process may be repeated when the seeds are taken out of storage immediately before planting.

Whilst women are responsible for seed selection, men play a role in conservation through constructing granaries or providing other forms of storage. Maize, as the principle staple food produced in larger quantities, is usually stored in a large granary (*tsala*) made of wooden poles, which stands high above the ground on stilts. Often, the space under the granary is used as a kitchen and smoke from the open fire is thought to contribute to conservation through keeping pests away. Alternatively, when the quantity is small the maize may be stored in sheaves hung from the high branches of a tree. In Massavasse, the cobs are stored on rooftops.

Beans, groundnuts and vegetable seed are usually produced in smaller quantities. Cowpea and groundnut may be stored in a smaller type of granary, closer to the ground, made of wattle and daub. This is called a *dhule* and has a small door just big enough to reach in and take the seeds out. Alternatively, small quantities of seed may be stored in a type of wicker basket that is closed at both ends, known as a *funge*.

A variety of other receptacles are currently used for seed storage including sacks, bottles, pots and hollowed out pumpkin shells (*xikutso*). Roots and tubers are conserved in the ground. In most cases,

treatment to improve seed conservation is limited to traditional methods including winnowing, smoking or drying. Seed stored in bottles or pots may also be mixed with ashes or even with petrol to keep away pests and to prevent people from being tempted to eat it. Some interviewees in Thlawene and Massavasse said that they use 'poison': a white powder to keep away pests whose chemical qualities they were not able to explain.

Once the grain and the seed have been stored, women and men may decide jointly on how it will be used: yet, women have the prime responsibility to ensure that there is sufficient food for the family and seed for the next planting season.

The meticulous process of seed selection described above has contributed to the development of seed types well adapted to the local environment (ICRISAT 2003; FEWSNET 2003). Interviewees gave the opinion that traditional farmer seed varieties are more tolerant to drought and are less dependent on chemical inputs than new varieties. The vast majority of interviewees said, for example, that they preferred the local *xichangane* type of maize to those from external sources on the basis that *xichangane* is more tolerant to drought. This preference is reflected in the fact that, by 2003, many farmers no longer cultivate externally sourced seed varieties, such as maize and cowpea, which had been distributed through disaster relief in 2001 (Ferguson 2003:3; Interviews in Chókwè 2003).

A significant exception to this type of intervention is the SARRNET initiative through local Government and NGOs, to introduce new, vitamin-rich varieties of sweet potato. The program has high acceptance amongst women farmers in Chókwè.

To some extent, farmers' gradual adaptation of local seed varieties – through careful selection – to suit local agro-ecological conditions as well as the maintenance of diversity, have contributed to resilience of the local farming system and helped rural households to survive the impact of drought. Currently, however, there are serious indications that this resilience is being eroded, as discussed in more detail below.

## **The content of local knowledge and evidence of erosion**

Local knowledge about seed and seed management is composed of knowledge about farmer varieties and of knowledge about the traditional techniques for seed selection, conservation and treatment as explained above.

Significantly to this study, the importance of diversity noted above means that the robustness of local seed systems relates to a wide knowledge of local crops and farmer varieties. The interview data collected for this study confirmed that small-scale farmers in Chókwè have a wide-ranging knowledge, and that there are gender differences in this knowledge.

Women and men were asked to recall the range of traditional crops grown in their household in the period before post-war resettlement. Women cited a considerably wider range of crops than men did, as shown in Table 12 above. This study illustrates that women have a wider range of knowledge around traditional crops and farmer varieties than men.

However, the study also revealed that women currently cultivate a narrower range of crops including traditional and recently introduced crops than men. Women used to know more about previously grown crops than men but in currently grown crops there are no clear differences between women and men. This seems to suggest that men have better access to information on new crops as well as the inputs needed for farming.

Another significant difference in knowledge of farmer varieties was found to exist between the older and younger generation. Younger adults interviewed for the study grew a narrower range of crops than their elders and were less able to identify traditional farmer varieties, as illustrated in Table 11 above. These differences can be explained by two possible scenarios:

1. Individuals gain particular types of knowledge only later in life.
2. A significant loss of local knowledge around seed is already occurring.

In the case of the first scenario, if people are dying younger due to HIV/AIDS, then they may never attain certain types of knowledge and will therefore not be able to pass it on to the next generation. According to the many references consulted for this research, women have more knowledge about seed than men; this knowledge is threatened by their relative lack of access to agricultural inputs. HIV/AIDS now threatens to intensify these problems.

## Complex dynamics of local knowledge

The history of changes in local seed knowledge is extremely difficult to trace. This relates to: complex nomenclature of varieties, opportunities for genetic adaptation and the lack of a systematic database on local seed or local knowledge around seed. It is important to signal these issues before looking at how local knowledge flows appear to be changing in Chókwè and the likely impact of HIV/AIDS.

Local farmers generally distinguish between seeds on the grounds of physical characteristics of the seed or the plant itself. Seeds may be named according to physical characteristics such as size and color of the seed; genetically determined qualities like cooking time<sup>13</sup> or for symbolic reasons such as the name<sup>14</sup> or activity of the person(s) said to have introduced the particular type of seed or the group of people said to have developed this type<sup>15</sup>. Yet, as Ferguson points out (see above), farmer varieties with different names and physical characteristics frequently do not correspond with genetic differences.

Tracing the history of ‘traditional’ seed varieties is further complicated by wide opportunities for cross breeding. In rural Chókwè there is continuous mixing and adaptation of seed varieties and, at least over the last couple of generations, natural calamities particularly drought have significantly influenced this process. As people run short or completely lose the seed they have conserved themselves, they search for other sources. Increasingly, the market plays a role. The result is often a mixing between farmer varieties and externally sourced varieties.

This is clear in Thlawene village, which lies within easy access of Chókwè town:

“We consider Chókwè as the center for us – anything we need, we look for it in Chókwè” (Community meeting in Thlawene 15/10/03).

When they turn to the market, people look first for the seeds they recognize and are familiar with, but eventually other criteria predominate including availability – “you can find it on the market” – and access – “you can pay for it”.

According to Thlawene residents, if they supplement their own small savings of seed with seed from other sources, they do not tend to separate the seeds. They sow everything together. The practice of mixing own seed with seed sourced from outside is one factor suggesting that farmer varieties are modified over time. In the same way that ‘traditional’ varieties become both physically and genetically mixed with ‘modern’ varieties, ‘traditional’ knowledge is also constantly changing and becoming ‘mixed’ or creolized with new knowledge about new varieties and knowledge from more formal sources (eg, schools, radio, extension agents, etc).

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<sup>13</sup> To illustrate, seed names may reflect size as in the case of *timanga tikulu* - large groundnut; or the maize seed known locally as *mabereni* (big), simply for being larger and more yellow in color than the familiar small white variety. In practice, *mabereni* probably refers to a range of maize seed varieties. By contrast, some names reflect genetic characteristics, for example the sweet potato *5 minutos* (five minutes), named for its short cooking time. Another example is the cassava type known locally as *Ximanhakelabuluku* – a name that people would not explain in detail since they said it was rude. However, it refers to fast swelling of the tuber when it cooks.

<sup>14</sup> Some plant types have been named after the person thought to have introduced this type to the area (e.g. ‘Rondina’ in Thlawene, a sweet potato found in Xai Xai and brought back by someone called Irondina; or ‘FAO’ - a maize seed introduced to Massavasse by the United Nation’s Food and Agriculture Organization (FAO) ).

<sup>15</sup> Other types are named after events or for more symbolic reasons, such as ‘Sector’ – a sweet potato said to have been developed for use by the so-called ‘family sector’ (small scale farmers using family labor) or, in another version, produced on a co-operative ‘family sector’ farm. Another sweet potato is known as *modiliva*; apparently taking the nickname for truck drivers bringing home goods that Mozambican migrant laborers have bought in South Africa: in other words, trucks laden with goods. The name was given because the plant is laden with many valuable tubers. Or, in another version, *modiliva* is derived from the English to ‘deliver’.

## **The erosion and construction of local knowledge**

Existing evidence suggests that changes in the local genetic resource base are heightened by natural calamities. When natural disaster leads to seed loss, farmers increasingly turn to the market. If farmer varieties are not readily available, farmers will buy whatever they find on offer. The consequences for tolerance to local agro-ecological conditions (such as recurrent drought) of these newly introduced varieties are not well known. However, farmers will over time learn by trial and error about these varieties and their adaptability to local agro-ecologies, thus building up the local knowledge base.

Another factor influencing change in the local genetic resource base is seed aid: free or subsidized seeds donated in times of crisis. In response to post-war resettlement and the impact of recurrent natural disaster in Chókwè, both the Government and Non-Governmental Organizations (NGOs) have made a number of short-term seed system interventions in the District.

Until recently, these interventions focused largely on the distribution of free seeds and tools using 'seed kits'. Local authorities and NGOs say in these cases they have to accept the donations, regardless of where the seeds have come from. Often these are sourced from completely different agro-ecological environments and even when the environment was similar, the donated seeds may be hybrid or other improved varieties best suited to irrigated agriculture.

The intention of such interventions is often limited to solve a short-term crisis. Yet, Dominguez and Jones (2003) have pointed out that repeated emergency interventions and the free distribution of externally sourced seed contribute to eroding the resilience of local seed systems: partly through erosion of local knowledge (Dominguez and Jones 2003). This phenomenon is not peculiar to Chókwè or even to Mozambique, and has been noted by a number of other authors including Musa (1998) and Tripp (2001).

Tracing the changes is extremely difficult due to the lack of systematized information on the existing genetic resource base. This makes it even more complicated to trace the likely impact of HIV/AIDS, both on the content of local knowledge and the process of local knowledge flows.

## 6. Information and knowledge flows

### Sources of knowledge and information

For most small-scale farmers in Chókwè District, local knowledge seems ‘intrinsic’ or natural to them and few people have ever reflected on how they came to acquire it. Interviewees in Chókwè frequently said they had learned everything they knew about seeds from their parents or that they knew intrinsically.

In practice, however, knowledge about particular varieties is influenced by the way in which the seed of these varieties is sourced. In ‘normal’ years, farmers almost invariably prefer to conserve seed from their own food crop production. Yet in poor years, which often turn out to be the majority, they must look for other sources. Moreover, local people actively innovate and seek new sources of seed and new information on seed and seed management to try to improve the quantity and quality of production.

The research reported here reveals that farmers gather information and gain knowledge on seeds from a variety of sources. Interviews in Chókwè indicate that the key sources of seed knowledge and information for local farmers are the following:

- Relatives, neighbors and friends.
- Travel to nearby areas that may have different climatic conditions (eg, Maxinhe residents often travel to nearby Massingir where many have relatives: this is seen as a key source of seed in difficult times since the reservoir at Massingir means there is always some seed production).
- Casual labor on commercial farms, bringing producers into contact with additional seed and new seed types.
- Experimenting on farm.
- NGO programs (such as the introduction of new sweet potato varieties by SARRNET through local institutions).
- Radio.
- Mobility – visits to the market in Chókwè, Macie and travel to other areas.
- School: some children are learning about agriculture at primary school and a few are learning new agricultural information at secondary school in Chókwè.
- Migration: in some cases migrant relatives have brought home new seeds and information from South Africa or Maputo.

In practice, then, local knowledge is not a static body of data but is a fluid concept constructed through a dynamic process of gaining, transmitting and shedding information. A wide range of factors influence access to and transmission of local knowledge and information around seed including: social networks, mobility, literacy, access to communications technology (such as radio), education, employment and training opportunities through external institutions (the Government or NGOs). Gender relations influence access to each of these factors and this is discussed below under Section 7.

Kinship relations remain highly important in getting access to information on the availability of, as well as actually acquiring seeds from other areas when local stocks are low, particularly for women who have less access to the market than men and less access to the modern media. Yet, market relations and the (re)-emergence of the private sector have an increasing influence over what is available and to whom.

## Influences on local knowledge

The type of knowledge and flow of knowledge around seed are influenced by the natural environment, the agro-economic history of an area and by social differences including gender, relative wealth and household composition. HIV/AIDS presents a new and threatening factor and this is discussed in the next section.

## Environment

The local agro-ecological environment influences the range of crops and seed varieties grown and, therefore, the body of local agricultural knowledge. This influence can be seen by comparison of the study communities.

With access to alluvial soils and better humidity, Maxinhe farmers use a wider range of farmer varieties than those in Thlawene, located in the drought-prone uplands. Analysis of the individual interview data shows that Maxinhe farmers tend to grow a wider range of local farmer varieties of traditional food crops than those in Thlawene, as illustrated in Table 13.

**Table 13. Comparative range of farmer seed varieties of selected crops grown by farmers**

| Location   | Groundnut     | Pumpkin       | Sweet potato  |    |
|------------|---------------|---------------|---------------|----|
|            | 2-5 varieties | 2-5 varieties | 2-4 varieties | 5+ |
| Maxinhe    | 67%           | 57%           | 57%           | 7% |
| Massavasse | 24%           | 38%           | 3%            | 0% |
| Thlawene   | 39%           | 26%           | 36%           | 0% |

## Economic history

Beyond the natural environment, economic history shapes the agricultural practice and the local knowledge base of rural communities. Agricultural history in Maxinhe and Thlawene has been influenced by male migration<sup>16</sup>, resource loss during the war, recurrent floods and drought and relative isolation from Government interventions except in the case of emergency relief.

Principally, local people blame natural disaster for the loss of traditional crops and farmer varieties. In Maxinhe, for instance, local farmers said that since the floods of 2000 they have lost access to sesame, certain varieties of pumpkin, pigeonpea and *tingolokotso* seeds.

Importantly, interviewees argued that the loss of a farmer variety itself leads to gradual erosion of knowledge around that seed. Knowledge of seeds is generally acquired through learning by doing – as children accompany their parents to the fields, as girls assist their mothers in seed selection. The absence of a certain variety means that knowledge around it can no longer be transmitted.

Evidence of this becomes clear through comparison of farmers' knowledge in Maxinhe and Thlawene, with Massavasse. Massavasse is situated within the Limpopo irrigation scheme, which dates from the 1950s. After national Independence in 1975, the irrigation scheme was nationalized and local producers were transformed into state company employees, growing mainly seed provided for them to plant. The aim of the

<sup>16</sup> Historians of southern Mozambique argue that sorghum and millet were gradually replaced by maize as women tried to compensate for male labor loss and also in response to increasing preference for maize through the influence of migration to South Africa (Harries 1996; Young 1977). Interviewees in Chókwè said they stopped growing these crops due to the labor demands involved in protecting the crop from birds.

irrigation scheme was to transform subsistence into commercial agriculture, principally through rice cultivation. Rice seed was provided on credit from state companies and all farmers within the scheme were expected to prioritize this crop. Maize and vegetables were encouraged only as a second season complement.

Interviewees in Massavasse claimed that a number of traditional crops to the area are no longer grown, including pea, chickpea, sorghum, *tikonjodji* (type of bean), pigeonpea and sesame. One cause of loss was the war, due to the difficulty of conserving seed as people were forced to flee attacks and hide in the bush. Meanwhile, however, the irrigation system is not functioning properly and there are severe constraints on the market supply and demand side of seeds and chemical inputs<sup>17</sup>. During the fieldwork (November 2003), there was no water in the canals and farmers had been advised not to bother planting rice.

In Massavasse, the percentage of farmers interviewed growing a wide range of crops (more than 10) has decreased over the last decade. However, in Maxinhe and Thlawene the percentage of farmers interviewed growing more than 10 crops (including traditional and recently introduced crops) has increased over time. This is illustrated in Table 14 below.

**Table 14. Percentage of interviewees growing a diverse range of crops over time according to location**

| Location   | interviewees | No. of crops previously grown |        |      | No. of crops currently grown |        |      |
|------------|--------------|-------------------------------|--------|------|------------------------------|--------|------|
|            |              | < 5                           | 6 – 10 | > 10 | < 5                          | 6 - 10 | > 10 |
| Maxinhe    | %            | 13                            | 60     | 27   | 23                           | 43     | 33   |
| Thlawene   | %            | 6                             | 65     | 35   | 35                           | 26     | 39   |
| Massavasse | %            | 10                            | 52     | 38   | 21                           | 43     | 31   |
| % of total | %            | 10                            | 59     | 31   | 27                           | 39     | 34   |

Only 3.4% of interviewees in Massavasse could identify two or more traditional types of sweet potato compared to over 60% in Maxinhe. Only 24.1% of interviewees in Massavasse could identify two or more types of groundnut compared to nearly 67% in Maxinhe. Yet both these crops were said to be traditional to Massavasse.

Judging by the relative lack of knowledge around local farmer varieties among interviewees in Massavasse, it seems that the troubled process of state intervention has eroded local knowledge.

This is further illustrated in relation to rice. New varieties of rice introduced to the irrigation scheme have replaced rather than complemented traditional varieties. None of the interviewees in the under 45 age group in Massavasse was growing any of the traditional rice varieties, and only 4% could identify those varieties<sup>18</sup>. This contrasts with 38% of interviewees in the elder age group who were able to identify two or more traditional types of rice. These findings conform with the comment of one elderly woman that: “Our granddaughters shy away from the seeds of traditional rice and do not even recognize it as being rice!”

This loss of knowledge around traditional farmer varieties may be explained by greater production potential of the new ones. However, the majority of interviewees said they abandoned the old types, not through preference, but because they were not able to sell the older varieties. Furthermore, they argue that although the new varieties produce a great deal more in ideal conditions, the older types were more drought resistant and did not require chemical inputs.

Comparatively limited local knowledge around seed in Massavasse clearly illustrates the fact that – where there are high levels of illiteracy, poor communications and lack of institutional organization – the

<sup>17</sup> The Massingir dam which was meant to supply the irrigation scheme was poorly constructed and works at less than 35% capacity whilst the irrigation system itself has been plagued by economic problems. Despite recent efforts to rehabilitate the irrigation canals after the damage of war, neglect and the floods, there are still technical problems.

<sup>18</sup> These days, producers in Massavasse do not select rice seed, partly because producers tend to sell all the grain and then purchase seed the following year. This is mainly related to the commercial policy of the rice companies. Fewer types of food crop are grown, again related to company policy regarding irrigated land. Very few households if any have a traditional granary (the research team did not observe any).

transmission of local knowledge depends on learning by doing. When local practices are abandoned, the related knowledge is likely to be lost.

## Gender-related differences

Women are mainly responsible for seed selection and conservation of traditional crops and this is reflected in the level of women’s knowledge compared to that of men (see above). Nearly 50% of women interviewed could identify two or more traditional types of pumpkin, for example, compared to some 30% of men. Some 41% of women could identify two or more traditional types of sweet potato compared to only 23% of men and 22% of women knew two to five types of cassava compared with just 3.8% of men.

Yet it is men who are more mobile, more literate and have greater access to a cash income and markets. These factors increase their access to new sources of seed and to new sources of information. Thus whilst more women (20%) than men (4%) knew two or more traditional farmer varieties of maize, a higher proportion of men (63.1%) than women (48.5%) knew one or more recently introduced varieties of maize. This indicates that men in general have better access to new sources of information and/or better access to the resources needed to make use of that information (for example, access to cash or credit for chemical inputs used with improved maize or rice seed varieties).

For women, relatively poor access to agricultural resources is exacerbated by poor access to information and training<sup>19</sup>. According to Government statistics, for instance, some 83% of rural women are illiterate (INE 1998) whilst in our sample, only 14% of women had access to seed information via the media (principally radio), compared to 39% of men (see Table 16 below).

As shown in Table 15, both women and men access information and knowledge around seed from a variety of sources. In both cases, the key source of this knowledge is through parents, relatives and neighbors and through travel, including emigration (mostly in the case of men). However, men have significantly greater access to information through the media: principally radio.

**Table 15. Access to information according to social factors**

| Sources of information         | Social Difference |          |             |             |              |             |           |
|--------------------------------|-------------------|----------|-------------|-------------|--------------|-------------|-----------|
|                                | Gender            |          | Age Group   |             | Social Class |             |           |
|                                | % of Women        | % of Men | % of Adults | % of Elders | % of Rich    | % of Middle | % of Poor |
| Parents, relatives & neighbors | 92.2              | 96.2     | 100.0       | 85.7        | 100.0        | 96.7        | 93.3      |
| Travel or migration            | 90.6              | 96.2     | 91.7        | 92.9        | 100.0        | 90.0        | 92.9      |
| Employment on commercial farms | 17.2              | 11.5     | 16.7        | 14.3        | 0            | 13.3        | 17.9      |
| On farm experimenting          | 48.4              | 42.3     | 41.7        | 52.4        | 75           | 50.0        | 42.9      |
| NGOs and rural extension       | 59.4              | 65.4     | 56.3        | 66.7        | 100          | 70.0        | 53.6      |
| Media                          | 14.1              | 38.5     | 12.5        | 31.0        | 75           | 33.3        | 10.7      |
| School                         | 4.7               | 3.8      | 4.2         | 4.8         | 25           | 3.3         | 3.6       |

## Generation-related differences

Older people (elder generation) interviewed mentioned a wider range of information sources compared to younger adult generation. This probably reflects the fact that people in this group have had more time to

<sup>19</sup> At national level, some 43.9% of household heads in the agricultural sector (73% of female-headed households and 35.2% of male-headed households) are illiterate. Only 0.6% of household members in the small and medium scale agricultural sector have formal training in agriculture (INE 2002).

accumulate knowledge from different sources. It also highlights a general dearth in access to alternative sources of information and learning. Only 13% of interviewees in the under 45 age group cited the media as a source of information on seeds and only 4% claimed to have learned something new about seeds at school. In almost all cases, interviewees cited parents or other close relatives as the key source of learning on farming in general and seeds in particular. This highlights the threat posed by impending heavy losses to the young adult generation due to HIV/AIDS.

Meanwhile, the apparent knowledge gap between the elder and adults generation suggests that certain types of knowledge are only gained in later life. In the study sample, a far higher percentage of adults under 45 than those of the elder generation were consistently unable to name any local varieties of selected food crops (see Table 11 above). Elder people continue planting traditional varieties while young adults are more interested on marketable varieties.

### **Wealth-related differences**

In general, interviews suggested that wealthier households are more likely to conserve and control their own seed, whilst poorer households are more often obliged to supplement their meager seed stocks with a little of whatever seed or grain they can find – and afford – on the market.

Notably, the vast majority of interviewees said they did not purchase seed at the formal shops but prefer to buy it at market stalls. They explained that the shops sell seed in relatively large quantities, that the prices are high and they do not trust the quality. Alternatively they argued that market seed is more accessible and can be bought in very small quantities if necessary, according to individual purchasing power. As one woman in Thlawene said: “I can buy seed for 1,000 Mt (less than 40 US cents) if that’s all I have”.

Analysis of the data on access to information indicates that wealthier households have better access to the media, to extension services and to relevant training at school, particularly when compared to poor households. Wealth-related differences intensify gender differences. Households headed by women alone tend to be among the poorest (in our sample of 38 FHHs, 71% were classified as poor) reinforcing the obstacles to seed security.

In sum, it seems that access to knowledge and information around seeds relates to a number of key factors including the opportunity to learn by doing, principally from parents, mobility and access to economic resources including labor power and a cash income. People learn about the seed types they are actually able to grow and this depends on the ability to conserve seed, to purchase seed or to acquire seed through other mechanisms. Access to all of these factors is affected by HIV/AIDS.

## 7. Measuring the impact of HIV/AIDS on seed knowledge and information flows

In this section we attempt to measure the impact of HIV/AIDS on seed knowledge and information flows through the use of proxy indicators and statistical analysis of the data collected. The analytical framework is first elaborated, describing the various proxies that were used in the analysis. Tables 16 and 17 provide an overview of the data collected, based on these proxies and other key household level factors that have the potential to explain agricultural practices and decision-making. The results of the statistical analysis are then presented and summarized.

### Analytical framework

This study considered three factors as proxies to HIV/AIDS affected households.<sup>20</sup>

1. Female-headed households.
2. Households taking care of the sickly.
3. Households taking care of orphans.

The hypothesis is that these factors explain the differences or variation in seed information flows and general level of seed security among the surveyed households.

What household level factors should be used to proxy the level of seed security and information flows by surveyed households? Information collected on these factors in the survey was limited, though some of these factors are listed in Tables 16 and 17. For analysis to have good analytical grounding, only those factors that constitute household behavior and can be altered by the households in the short term (ie, within one cropping year) will be considered. These therefore will be:

- Area of cultivated land in lowlands.
- Area of cultivated rainfed land.
- Area of irrigated land.
- Number of crops grown.
- Number of crops lost.
- Whether households select seed for planting.
- Whether households use purchased chemicals to preserve seed.
- Whether households use modern sources of information dissemination.

Chi-square, ANOVA tests and logistic regression were used to estimate the effects of HIV/AIDS (affected households) on seed security status and seed information flows.

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<sup>20</sup> Past studies have not clearly established what household factors are best used as proxies to HIV/AIDS affected households. The use of female-headed households as a proxy to HIV/AIDS affected household has two main weaknesses: The female household-head could be either a divorcee or a single parent and not widowed through death of spouse and it also does not consider widower-headed households which could also be affected. A household caring for the sickly is not a good proxy, as it does not differentiate between households that have been caring for their sick for a long period and those who have just recently started caring for their sick. This also holds for households in which someone may have already died due to HIV/AIDS and others have yet to show signs of illness. A household caring for orphans whose parent(s) died of HIV related illnesses is another proxy for a household affected by HIV/AIDS, though it may not necessarily be the case that the orphan or other members of the household have HIV/AIDS themselves.

## Socio-economic environment of surveyed households

As described in Section 3, a total of 90 farmers or respondents, representing 90 households, were interviewed individually. Out of 90 respondents interviewed for the study, 71% were female and 29% male. Survey outcomes of some key household level factors with the potential to explain the behavior or decision-making in the farm production process of the households are shown in Table 16 for qualitative factors and Table 17 for quantitative ones. ANOVA shows that female-headed households had a significantly smaller household size ( $p=0.05$ ) and fewer agriculturally active household members ( $p<0.01$ ) than male-headed households. However dependence ratio in male and female-headed households were not significantly different. Furthermore male-headed households had more than three times as much irrigated land as their female counterparts. Given that the area of cultivated land is considered to be an indicator of household wealth (Table 1, Section 3), this also suggests that male-headed households tend to be better off than female-headed households.

Table 16. Some qualitative characteristics of surveyed households in Chókwe

| Characteristics         | Categories                                     | Percent of respondents (N=90) |
|-------------------------|--|-------------------------------|
| Household head          | 1. Female                                      | 42                            |
|                         | 2. Male  | 58                            |
| Age group               | 1. Young - <35 years                           | 31                            |
|                         | 2. Middle-35-55 years                          | 38                            |
|                         | 3. Old ->55                                    | 31                            |
| Wealth group            | 1. Poor  | 62                            |
|                         | 2. Medium                                      | 33                            |
|                         | 3. Rich  | 5                             |
| Cultivated land         | 1. Lowland                                     | 57                            |
|                         | 2. Rainfed                                     | 76                            |
|                         | 3. Irrigated                                   | 30                            |
| HIV affected households | 1. Caring for the sick                         | 16                            |
|                         | 2. Caring for orphans                          | 36                            |
|                         | 3. Caring for sick or orphans                  | 43                            |
|                         | 4. Caring for sick or orphans or female-headed | 62                            |

N= number of respondents or interviewees

Table 17. Some quantitative characteristics of surveyed households in Chókwe

| Household characteristic   | Mean (N=90)              |                        | ANOVA test               |
|--|--------------------------|------------------------|--------------------------|
|  | Female-headed households | Male-headed households |                          |
| Household size   | 6.3                      | 8.1                    | Significant ( $p=0.05$ ) |
| Agriculturally active members  | 2.6                      | 4.0                    | Significant ( $p<0.01$ ) |
| Dependents   | 3.8                      | 4.1                    | Not significant          |
| Area of cultivated lowlands  | 1.1                      | 1.5                    | Not significant          |
| Area of cultivated rainfed land  | 1.2                      | 1.2                    | Not significant          |
| Area of cultivated irrigated land  | 0.7                      | 2.3                    | Significant ( $p=0.03$ ) |
| Number of crops lost in recent past (number of crops now minus number in the past) | -0.1                     | 1.8                    | Significant( $p=0.01$ )  |

Were there significant differences in some qualitative household characteristics between female and male-headed households? Using chi-square test, results show that more female-headed households than their male counterparts were caring for the orphans ( $p < 0.04$ ). But there were no significant differences between the two categories of households in taking care for the sickly (Table 18). Further analysis also shows that a greater proportion of female-headed households were poorer than their male-headed ones although tests did not reveal any significant differences.

**Table 18. Differences in some qualitative characteristics between female and male-headed households in Chókwe**

| Household characteristics                                  | Percent reporting                                |                                  | Chi-square test            |
|--|--|----------------------------------|----------------------------|
|  | Female-headed households<br>(n <sup>1</sup> =38) | Male-headed households<br>(n=52) |                            |
| Take care of the sickly                                    | 16   | 17                               | Not significant            |
| Take care of orphans                                       | 47   | 27                               | Significant ( $p < 0.04$ ) |
| Use recommended time of seed selection                     | 63   | 65                               | Not significant            |
| Have access to modern methods of information dissemination | 63   | 65                               | Not significant            |
| Use purchased chemicals to preserve seed                   | 13   | 15                               | Not significant            |
| Household is poor  | 71   | 56                               | Not significant            |

<sup>1</sup>n= number of respondents

## Impact of HIV/AIDS on seed security - case study results

The results of Chi-square and ANOVA tests for qualitative and quantitative dependent variables respectively are shown in Table 19. Female-headed households had a significant negative association with area of cultivated land under irrigation and the number of crops currently grown by the households. Female-headed households had a mean of 0.7 acres of cultivated land under irrigation while male-headed households had 2.3 acres.

**Table 19. The impact of HIV/AIDS on seed access and seed information flows in Chókwe**

| Dependent (influenced) variables  | Independent (influencing) variables      |   |  |
|---|--|---|--|
|   | Female-headed household<br>(1=yes; 0=no) | Households taking care of the sick<br>(1=yes; 0=no) | Households taking care of orphans<br>(1=yes; 0=no) |
| Cultivated area in lowlands   | ns <sup>1</sup>                          | ns  | +ve ( $p < 0.01$ )                                 |
| Cultivated area under rainfed   | Ns                                       | ns  | Ns   |
| Cultivated area under irrigation  | -ve <sup>2</sup> ( $p = 0.04$ )          | ns  | -ve ( $p = 0.07$ )                                 |
| Number of crops currently grown   | -ve ( $p = 0.08$ )                       | ns  | Ns   |
| Number of lost crops (currently grown minus no. grown in the past)        | +ve <sup>3</sup> ( $p = 0.08$ )          | ns  | Ns   |
| Whether household selects seed for planting (0=no; 1=yes)                 | Ns                                       | ns  | Ns   |
| Whether household uses purchased chemicals to preserve seed (0=no; 1=yes) | Ns                                       | ns  | -ve ( $p < 0.01$ )                                 |
| Whether household accesses information from modern sources (0=no; 1=yes)  | Ns                                       | ns  | -ve ( $p = 0.08$ )                                 |

<sup>1</sup>ns = no significant association between the influencing and the influenced variables

<sup>2</sup>-ve = negative association between independent and dependent variables

<sup>3</sup>+ve = positive association between independent and dependent variables

Female-headed household also planted about 8 different crops at the time of survey compared to the male-headed households which planted 10 different crops. Furthermore, female-headed households had lost 2 crops in the recent past while their male counterparts had lost none. Assuming that female headed-households are proxies to HIV/AIDS affected households then those households had somewhat diminished access to seed supply. Households with some cultivated land under irrigation have more stable access to own-saved seed as drought does not affect their seed supply. However, given that female-headed households tend to be poorer than male-headed households, it is also very possible that these differences are caused by poverty, not simply whether or not the household is affected by HIV/AIDS. Households with some cultivated land under irrigation have more stable access to own-saved seed as drought does not affect their seed supply.

Whether a household was caring for the sick or not had no significant influence on access to seed and seed information flows. Nevertheless, households that were caring for orphans were significantly and negatively associated with area of cultivated irrigated land, use of purchased chemicals for seed preservation and access to extension and media for information dissemination. Not a single household caring for orphans reported purchase of any chemicals for seed preservation. Furthermore 53% of households caring for orphans reported that they had access to extension or NGOs and media as sources of information dissemination compared to 71% of households not caring for orphans. Households caring for orphans had only 0.8 acre of cultivated irrigated land compared to 2.1 acres of those not caring for orphans. Therefore it is safe to conclude that households that were caring for orphans were more likely to face seed access and seed information flow constraints than other households. Nevertheless, the positive and significant association of households caring for orphans and area of cultivated lowlands is a puzzle that requires further clarification from the surveyed community<sup>21</sup>.

The data was also subjected to logistic regression: there was a weak negative relationship ( $p=0.08$ ) between households caring for orphans and modern sources of information like NGOs, extension and media. However, logistic model requires a greater number of observations than 90 cases for more accurate predictions.

## Summary

Female-headed households, households caring for the sick and households caring for orphans were used as proxies to HIV/AIDS affected households. Data collected from 90 households in three villages were subjected to descriptive statistics, ANOVA and chi-square tests to determine the level of association between HIV/AIDS and factors related to seed access and seed information flows e.g. cultivated area under irrigation, whether farmer selected seed for planting, whether farmer used purchased chemicals for preserving seed, whether farmer had access to modern sources of information dissemination like NGOs, extension and media etc.

The results suggest that HIV/AIDS affected households especially those households caring for orphans experienced constraints in access to seed and seed information. These households had smaller acreages of cultivated land under irrigation; none of them used purchased chemicals to preserve seed; and they were also less exposed to modern sources of information dissemination. Female-headed households were also less seed secure than their male counterparts as they had significantly smaller pieces of cultivated land under irrigation, planted fewer crops and had lost a higher number of crops in the past, possibly due to illnesses, death of a husband and lack of money to purchase available seed of preferred crops.

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<sup>21</sup> Possible explanations might be that orphans provide additional labor to the household, thus allowing the household to cultivate more lowland areas, or that land tenure relations are such that a household caring for orphans has rights to the land that had previously been cultivated by the orphans' parents.

## 8. On-going initiatives relating to seed systems and local knowledge

Until recently, little had been done in Chókwè to address either the erosion of knowledge around local farmer varieties or the broader impact of HIV/AIDS on agricultural production. Some promising, on-going initiatives are now emerging.

In 2002, ICRISAT in collaboration with MADER developed a 'methodology for planning seed system interventions'. This includes the development of district level 'Seed System Profiles' (SSP). The SSPs provide local authorities and stakeholders with a better understanding of the mechanisms used by women and men farmers to obtain seeds during normal and stressed situations, with aim of enabling Government authorities to plan better interventions that assist farmers without disrupting local seed systems.

These Seed System Profiles are a first step towards addressing the lack of systematic information on farmer varieties and the local seed system.

With technical support from ICRISAT, the Government and FAO have initiated the use of local Seed Fairs. This methodology presents an alternative to free distribution of seed kits, whereby farmers have little say over the seed varieties on offer and the local market for seed is by-passed. Through the local seed fairs system, specific categories of (seed insecure) farmers receive a subsidized voucher which they can exchange for the seed of their choice at the fair. Local producers are encouraged to market their seed, so that farmers can buy seed varieties well adapted to local conditions.

The Government's rural extension service in Chókwè is focused on communities within the irrigation scheme and prioritizes the introduction of improved varieties of crops with a relatively high commercial value including rice and vegetables. SARRNET in partnership with the DPADR and locally active NGOs, however, has now developed a broad network of contacts to introduce and teach farmers new techniques around the production and use of new, vitamin-enriched varieties of sweet potato. In Chókwè, sweet potato is produced almost exclusively by women; it is low on labor demand and a low risk crop to produce. The SARRNET program has gained wide popularity in the District. It suggests a model for appropriate interventions that can enhance the agricultural production and food security of poor and vulnerable households in the context of HIV/AIDS.

## 9. Conclusions

The research documented in this report threw up a number of methodological problems in trying to identify the likely impact of HIV/AIDS on local knowledge around seed. To thoroughly understand the impact of HIV/AIDS, it would be necessary to isolate this from the impact of other factors influencing change in local knowledge and knowledge flows. Yet this is almost impossible.

On the one hand, it is extremely difficult to trace changes in the content of local knowledge, due to the multifarious factors affecting that knowledge and its transmission, including natural disaster, economic changes and government interventions. On the other hand, at least until very recently there has been no systematic database recording local knowledge around seed as a baseline from which changes might be traced.

The early phase of the HIV/AIDS epidemic in Chókwè heightens the difficulty of trying to trace changes in knowledge flows around seed. The growing number of orphans, for instance, has only become a serious problem in the last two to three years and it is hard to tell, as yet, what the long-term impact will be on access to information for orphaned children. Comparative studies conducted in areas with a longer history of HIV/AIDS mortality might usefully focus more on the experience of orphans and child-headed households than the research for this study was able to do.

In spite of these difficulties – indeed, partly because of them – it is already clear from these research findings that HIV/AIDS is likely to have a highly negative impact on local knowledge around seed. The warning is timely, before mortality levels dramatically increase.

Based on the findings from this study, one can conclude that the genetic resource base for small-scale farming in the District is dynamic and changing, that local knowledge around seed is being eroded and that various obstacles exist to learning and acquiring new information around seed. The findings indicate that, under current conditions, HIV/AIDS is likely to accelerate loss of traditional knowledge and increase the barriers to learning.

Poverty and the impact of natural disaster have meant that farmers must often look beyond their own farm to source adequate seeds. The relationship with external sources of seed is very often a dependent one, however, as seed insecure farmers must ask for gifts, borrow from relatives and friends or, increasingly, turn to the market or to donations.

Changes in the genetic resource base that are supply led, ad hoc and uncharted, lead to weakening of the local knowledge system in ways that are liable to increase dependency on imperfect seed markets and outside interventions, instead of strengthening the robustness of local production and incipient marketing systems. HIV/AIDS reinforces this trend to increased dependency.

Until recently, seed system interventions in Chókwè may have contributed to this trend. The Government Rural Extension Service operates principally within the irrigation scheme and is focused on commercial crops. Given the troubled history of the irrigation scheme itself and continuing market failures in access to improved seed and related inputs, the unintended side effects may include increasing vulnerability for the poorest households. The case study findings show that knowledge loss around traditional farmer varieties has meanwhile been sharper in this area than elsewhere.

Outside the irrigation scheme, there has been little government intervention in agriculture except for emergency relief programs in the form of free seeds or food. Though this responds to a critical short-term emergency, the case study findings support evidence to suggest that the long-term effects may erode the stability of local seed systems, with negative consequences for the transmission of knowledge about local seed.

The case study findings strongly suggest that HIV/AIDS is likely to increase social polarization and reinforce the existing trend towards knowledge loss around traditional farmer varieties (evidenced in the knowledge gap between elder and younger generation adults) with a parallel increase in dependence on non-local varieties. These varieties may be less well adapted to local agro-ecological conditions or may only be suitable when other inputs such as a reliable water supply, fertilizer and pesticide are available and accessible to the farmer. In this case, affected households are likely to have least capacity to access these inputs.

Illness, death and the added burden of care imposed by HIV/AIDS reduce the amount of labor and income available for agricultural production. For ‘affected households’ in our sample, reduced labor and income have led to reduced area under cultivation and a reduced range of crop and seed varieties planted. As illustrated by the findings, in the current context where knowledge and information around farmer varieties is not formally documented or stored, but is transmitted informally from elders to youth, these effects are likely to intensify the loss of knowledge around local varieties. The lack of recorded data on local varieties further means that changes in the genetic resource base are hard to trace. In this context, we are already losing the ability to know what is lost.

Social differences such as gender and class affect access to agricultural inputs, labor power and markets and, thereby, to knowledge and information. Although women interviewed in Chókwè generally knew more about local varieties than men, they had weaker access to new information. The research shows that, when people lose their seed stocks and are forced to rely on markets or handouts, knowledge around traditional varieties and seed management tends to erode. The high percentage and relative poverty of women heading households alone should therefore be seen as a serious threat to the continued transmission of local knowledge.

Seed system interventions meant for disaster relief or development carry some unintended risks. Yet, a far higher risk is now posed by the long-term impact of HIV/AIDS. At the household level, access to each of the factors contributing to local knowledge and information flows is threatened by HIV/AIDS. Labor capacity, capacity to learn, mobility, access to information, and access to an income are all diminished by AIDS.

These observations raise serious questions over how to achieve the Government's policy objectives of food security and poverty reduction through the current strategy of concentrating public investment in areas of 'high production potential' and focused on commercial cash crops.

There is, then, an urgent need for rural development and poverty reduction programs to take the impact of HIV/AIDS more seriously into account, in relation to seed and food security. This should include the protection of local knowledge around seeds and seed management – through recording that information and storing it in easily accessible form – as well as the introduction of new techniques, extension methods and commercial mechanisms that enable local farmers to develop and improve local varieties of seed.

## 10. Recommendations

In light of the above conclusions, some preliminary recommendations are made towards ensuring that seed system interventions contribute to strengthening community resilience in the face of HIV/AIDS and avoid undermining those systems:

- Information on local seed characteristics and management practices should be systematically recorded, stored in a form that is easily accessible to rural producers and disseminated. For example, this could involve the network of primary schools, making use of the new primary school curriculum which opens a space for integration of local teaching materials (eg, through the use of school gardens; inviting elderly people to talk about seeds and seed management at the school).
- The Seed System Profiles make an important step towards recording information around local seed systems. These should be further developed to include more information on the social factors involved in seed management.
- Measures should be taken to increase the availability and accessibility of local varieties, or seed from other sources but well adapted to local agro-ecological conditions. The local Seed Fairs sponsored by UCEA/DINA/FAO are a useful contribution. Information exchange between farmers and extension workers and visits to other areas with similar agro-ecological conditions could facilitate this.
- Research and extension should give greater focus to the improvement, in situ, of local varieties that, even though less productive than improved varieties in ideal conditions, present less risk and less labor costs to the farmer. The specific time and labor constraints faced by women should be taken into account.
- Government and NGO rural extension programs should further facilitate the development of seed multiplication fields within local communities using traditional seed varieties.
- Government institutions and NGOs should further develop practical training programs based on local agricultural knowledge that are easily accessible to out-of school youth, girls and boys, including orphans. Revision of the adult literacy curriculum presents another opportunity for integrating useful and accessible agricultural information.
- Improved varieties developed outside the community could be pre-tested in the community together with local farmers, women and men, allowing them to select the preferred qualities.
- New varieties should be developed taking into account the resource and particularly time constraints faced especially by women farmers and should be introduced using in situ physical demonstrations. The example of SARRNET should be examined to see how this could be replicated to include a broader range of crops and varieties.

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# Annex 1: Research Tools

A three-day PRA exercise was carried out in each community, followed by 30 individual interviews also in each community. This consisted of the following:

## **PRA Day 1**

The PRA began with a community meeting, a presentation of the project and an interview on village history and socio-economic organization.

Community Mapping Exercise, including location and type of key agricultural resources (eg, rivers, soil types).

## **PRA Day 2**

Focus group interviews were held with four different groups including elder women and elder men (45 years of age or older) and younger women and younger men (under 45) regarding local agricultural practice and traditional knowledge on crops and different seed types. This included a discussion of which crops and seed types people prefer and why, which traditional crops or seed types are no longer practiced and why and which have been newly introduced, if any.

It further included a ranking exercise in relation to the crops that different groups saw as being most important, as well as a wealth ranking exercise.

Data from these discussions was used to obtain a profile of traditional seeds and new seed types in each community, to build up a picture of changes in the local seed system and in the range of knowledge on seeds transferred from one generation to the next. It also helped to construct a picture of social differentiation in each village.

## **PRA Day 3**

Focus group interviews were held with four different groups including elder women and elder men (45 years of age or older) and younger women and younger men (under 45) regarding seed management practices, the gender division of labor, knowledge around seed and changes in these factors over time. These group interviews served to discuss the process of knowledge transfer around seeds, sources of information and obstacles and opportunities to transferring knowledge and information around seeds.

## Annex 2: Workshop Reports

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### **IMPACT OF HIV/AIDS ON GENDERED INFORMATION FLOWS RELATED TO SEEDS AMONG RURAL PRODUCERS.**

WORKSHOP REPORT: 26th November, Chókwè

#### **Introduction**

Under the Terms of Agreement between the Food and Agricultural Organization of the United Nations (FAO) and the Institute for Crop Research in Semi-Arid Tropics (ICRISAT), on 26th November 2003 ICRISAT organized a workshop to present and to verify preliminary results of a case study conducted in Chókwè District. Organized by ICRISAT with co-funding from the National Directorate of Agriculture (DINA) and the FAO 'LINKS' project, the case study aims: "To understand the impact of HIV/AIDS on the flow of information on traditional knowledge around genetic resources utilized for food security".

This report briefly presents the background to the study, methodology used for the research, purpose and outcomes of the workshop and next steps in the project.

#### **Background to the study**

Food security in rural Mozambique is underpinned by farmers' ability to make decisions about what crops to grow and which inputs to use. This depends on experience and the availability of information that enables them to make informed choices. At household and community level, a key factor in food security is local knowledge on seeds and seed management.

Existing research shows that the gendered division of labor in rural Africa means that women, particularly elder women, are often the key source of local knowledge on seeds. However, women's local knowledge as well as their access to new information have often been marginalized by formal sector interventions.

Emerging evidence now suggests that local knowledge systems in southern Mozambique are coming under threat, from a rapidly changing socio-economic environment. This threat includes the increasing impact of HIV/AIDS. The HIV/AIDS epidemic itself has a gendered impact, reflecting and tending to exacerbate gender inequalities.

In this context, ICRISAT with financial support from DINA and FAO-LINKS has undertaken a case study aiming to better understand how gendered knowledge and information flows on seed and seed management operate in practice and the likely impact of HIV/AIDS on these systems. Such understanding can help improve the effectiveness of external interventions aimed to strengthen local coping capacity in the face of crisis.

This study has counted with further participation and diplomatic support from the National Directorate of Women's Affairs (DNM) of the Ministry of Women's Affairs and Co-ordination of Social Action (MMCAS).

## **Methodology**

Fieldwork for the case study was conducted in Chókwè District between early September and early November 2003. It was carried out by Dr Rachel Waterhouse, Lead Scientist for the project, and three local Research Assistants: Eng. Milly Devji (Agronomist), Deborah de Carvalho (representing the DNM) and Cerejeira dos Santos Tinga (final year student, Arts Faculty, University of Eduardo Mondlane).

Research was carried out in three rural communities selected to provide a comparison between the three principle agro-ecological areas found within Chókwè District, namely: drought-prone uplands, lowlands prone to cyclical drought and floods and lowland area within the extensive Limpopo irrigation scheme. Chókwè District as a whole has particularly high prevalence rates for HIV/AIDS, but there is no breakdown of figures available within the District.

The study was conducted using mainly qualitative research methods including interviews with key informants, semi-structured interviews with focus groups and individual interviews and Participatory Rural Appraisal techniques including time lines, community mapping, wealth ranking and prioritization exercises.

A three-day PRA exercise was carried out in each community, followed by 30 individual interviews also in each community. Of these, 20 interviewees were selected by 'snowballing' technique and 10 were selected to reflect the type of problem related to HIV/AIDS, namely households: headed by widows/widowers, caring for a terminally ill patient or caring for orphans.

## **Purpose and content of the workshop**

The purpose of the workshop, held on 26th November 2003 in Chókwè District of Gaza Province, was to present and discuss the preliminary findings with local people and institutions involved in the fieldwork phase. This was in order to maximize local participation in the study, feedback the findings for verification and comments and obtain local views on the policy related questions arising from the study.

Invitations to the workshop were sent to three representatives from each local community, local government institutions and Chókwè-based NGOs involved in seed systems, agricultural and HIV/AIDS related interventions.

Given that the problems related to seed security, seed knowledge and information and HIV/AIDS are common to Gaza Province as a whole, also invited were the District Directors of Agriculture from Gaza Province.

It was unfortunate that due to some unexplained confusion around dates of the workshop as well as transport difficulties, only a limited number of community representatives eventually took part in the workshop. Nonetheless, there was a high level of participation from local institutions and particularly the DDAs.

The workshop proceedings consisted of an official opening by the Chókwè District Director of Agriculture and an introduction to the study by ICRISAT, followed by a presentation of the preliminary research findings. After questions of clarification, participants divided into three working groups to discuss the findings of the study as well as their suggested response. In the final session, results of the group work were presented and discussed in plenary session.

## **Key points arising from the workshop**

Participants at the workshop broadly confirmed that the study findings were accurate and relevant. Furthermore, they noted the importance of the workshop in calling attention to aspects of the impact of HIV/AIDS which they had not really considered. Participants from the agricultural sector, especially,

remarked that they would have to take the impact of HIV/AIDS more seriously into account, both at institutional and operational levels.

Participants noted that HIV/AIDS would have a particularly dramatic effect on agriculture since its main impact is on economically active adults, usually the most productive group in rural society. This implies reduced seed production and reduced seed security: not only because of illness due to HIV but also through the impact on other household members who will have to care for – and invest their meager resources in protecting – the sick and orphans.

On the question of how to mitigate the impact of HIV/AIDS on seed security, and on knowledge and information flows around seeds, participants made a number of suggestions:

- First and foremost, they suggested, there must be more investment in AIDS education and prevention in the rural areas.
- Seed banks could help to ensure the continued availability of locally adapted genetic resources.
- Seed Fairs, as well as Casa Agraria (local shops where agricultural inputs can be bought, purchased on credit or exchanged) could help resolve the problems around availability of local seed adapted to local agro-ecological conditions.
- Institutional support to experience and resource sharing between communities with similar agro-ecological conditions could help expand the options for maintaining locally appropriate seed.
- Creation of a database produced in local languages and housed at a locally accessible institution such as the primary school could help to protect local knowledge.
- Rural extension support to multiplication of local seed varieties within the local community could contribute to improving the quality and quantity of local seed and thus reducing dependence on seed from outside and not always suitable sources.

### **Next steps**

Comments and suggestions from the Chókwè Workshop will be fed back into the forthcoming Maputo Seminar, where study findings will be presented to policy makers and managers in the capital. They will also be fed into the final analysis of findings and the Case Study report to be produced as a result of the research.