

**Contribution of cassava and sweet potato production to the livelihood of
smallholder farmers in HIV/AIDS context: The case of Zvishavane
district, Zimbabwe**



A Research project Submitted to Larenstein University of Applied Sciences in Partial Fulfillment of the Requirements for the Degree of Master of Management of Development specialization Rural Development and HIV/AIDS

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September 2010

Wageningen
the Netherlands
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Acknowledgements and Dedications

Acknowledgements

I give special thanks to the RDA course coordinator Ms Koos Kingma for the professional support throughout the course.

I greatly acknowledge and give special thanks to my research project supervisor Mr Robert Baars for the guidance through all the stages of the research. Your critical comments gave direction and enlightened me as I worked through to the completion of this research report.

I would like to acknowledge Africare Country Representative, Mr Paul Chimedza and the Sustainable Livelihoods Manager, Mr James Machikicho for giving me the opportunity to carry out my study on the project implemented by Africare in Zvishavane district. It gave me an opportunity to appreciate livelihoods of smallholder farmers in real life situation. I am also grateful to Mr Mahachi and Mr Gundani for all the logistics in Zvishavane district which were quite crucial for the study.

I also give thanks to the farmers who gave their time to provide information for my study.

I would like to give special appreciation to my family and friends for encouragement and support throughout the whole period of my study.

Above all I thank God Almighty for being sufficient for me. Without Him I would not have managed.

Dedications

I dedicate this research project report to my mother Evelyn

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ACRONYMS

AIDS: Acquired Immunodeficiency Syndrome

CSO: Central Statistics Office

ECA: Economic Commission for Africa

HIV: Human Immunodeficiency Virus

FAO: Food and Agriculture Organisation of the United Nations

FANRPAN: Food Agriculture and Natural Resources Policy Network

IFAD: International Fund for Agricultural Development

IITA: International Institute of Tropical Agriculture

PLWHA: People Living with HIV/AIDS

PRA: Participatory Rural Appraisal

UNAIDS: The Joint United Nations Programme on HIV/AIDS

Abstract

The research problem that formed the basis of this study was Africare's lack of information on the contribution of cassava and sweet potato production to reduce the households' vulnerability to the impact of AIDS. Cassava and sweet potato were introduced for in the wards that had highest HIV prevalence in Zvishavane district which is also a drought prone area. The wards were rated to have high levels of food insecurity at the time of introduction. The purpose of the study was to explore how the contribution of cassava and sweet potato to household food security and income affected the livelihood assets of HIV/AIDS affected households. The introduction of cassava and sweet potato under the Midlands Food Security and HIV project for was both a drought and AIDS impact mitigation strategy considering that the crops are labour extensive, drought tolerant and have low requirement of external inputs like inorganic fertiliser.

The study had a qualitative approach based on empirical data and literature. The data collection involved interviews with 16 smallholder farmers in four categories: three HIV/AIDS affected and one non-affected. The HIV/AIDS affected were households that had chronically ill persons, experienced death from HIV/AIDS related illness or caring for orphans. It was expected that the different categories would reveal differential impact of AIDS on the households.

Data was collected by use of combination of methods which included mapping (PRA tool adapted), direct interviews, direct observations and Africare project reports. The use of mapping to collect data for area under cultivation and crops grown by the household was found to be quite useful. It was interesting to note that the households could not quickly provide information about the size of their farms and area under cultivation. Using the map estimations of the area under individual crops was added up to give the total farm area under cultivation. It provided information on land the households have access to and how it is used as a livelihood capital. From the crops grown, the households provided further information on the time frame the crop would suffice household needs and also provided information on crop sells. It led to the drawing up a food availability calendar which provided information on food gaps and farmers explained their coping strategies. The key informants were extension workers and root and tuber association representative whose interviews yielded information on cassava and sweet potato production constraints, adoption of the crops, impact of growing the two crops on livelihood assets.

The sustainable livelihood framework was adapted for data analysis to show the impact of AIDS on the livelihood assets and to assess how the contribution of cassava and sweet potato to food security and income affect livelihood assets. The results of the study showed that HIV/AIDS affected households disposed assets in responding to food insecurity and increased expenditure for medical reasons. Labour loss resulted in lowest area under cultivation with households caring for chronically ill worst affected. Cassava is scarcely grown and the low production affected the extent to which the crops could contribute to household food security and income, and ultimately the household asset base. Sweet potato was grown in all household categories. After the introduction of cassava and sweet potato maize remained the major crop grown by the farmers indicated by the largest proportion of land under cultivation. However, drought has undermined maize production with most households in the study having a total crop failure in the last cropping season (2009/2010). The study revealed a six month food gap between the times when all HIV/AIDS affected households would have exhausted the maize crop with next

expected harvest. Maize, cassava and sweet potato are available for consumption within the same time line.

The recommendations included targeting the six month gap for food availability as a point for intervention when the HIV/AIDS affected households are most likely to dispose their assets for food insecurity reasons. Africare should also concentrate on supporting sweet potato which the HIV/AIDS affected households are familiar with and takes a shorter time to maturity. Restocking planting material would also require the farmers' commitment in the multiplication of the planting material. Through collaboration Africare can facilitate the education of girls to improve their future livelihood options.

Chapter One: Introduction

HIV/AIDS is one of the major external shocks that are threatening rural livelihoods in Zimbabwe. Kwaramba, as cited by de Waal and Whiteside (2003) indicated that maize production in smallholder and communal farms had declined by 61% in 1997 due to HIV/AIDS related morbidity and mortality. Loss of productive labour is the immediate impact of HIV/AIDS as labour is lost through illness of a household member and reallocation of labour to care for the sick. The traditional care-giving role of women is noted to increase in HIV/AIDS context when labour is reallocated to care for the sick. The increased morbidity and mortality of productive age has a wide range of socio- economic impacts on rural livelihoods resulting food insecurity, poor asset base and low income for HIV/AIDS affected households. In response, the rural households develop strategies to avert the impact of AIDS and are thus considered as active strategists rather than passive recipients. Topouzis (2003) indicated that 'HIV/AIDS affected households tend to change their cropping patterns, shifting to crops that are less labour intensive, have shorter lengths of time for returns, and require less capital inputs'.

Among development efforts to mitigate the impact of AIDS, cassava and sweet potato production have been promoted to improve food security of HIV/AIDS affected households. In Zimbabwe, Africare has promoted production of these crops under the Midlands Food Security and HIV project (MFH) in Zvishavane and Shurugwi districts (Africare 2007). The project was implemented in partnership with the International Fund for Agricultural Development (IFAD) as the funding agency. Africare is a non-governmental organisation which has been operational in Zimbabwe from 1981. It provides emergency relief aid as well as long term development assistance. The priority of Africare programmes has been long term development and sustainability, to improve quality of life and reduce household vulnerability to future crisis. The development assistance has been in three key areas health and HIV/AIDS, food security and agriculture; and water and sanitation. Africare's food security and agriculture programs focus on improving food availability, access and food utilisation. The organization works in partnership with individual farmers and farmer associations with principal objectives of linking food production and productivity to improved nutrition and income.

Cassava and sweet potato are drought tolerant crops, labour extensive and require low external input in comparison to maize (staple crop). However, cassava and sweet potato production were promoted at the time when several households had suffered the impact of AIDS including impact on labour. The focus on cassava and sweet potato in this research project was derived from the need for knowledge on how these low input and labour extensive crops are important in addressing constraints of HIV/AIDS affected households. In a study conducted on land utilization by HIV/AIDS affected households in Uganda it was reported that AIDS affected households shifted from high input and labour intensive crops (banana and groundnut) to low input and labour extensive crops (cassava and sweet potato) (Hunter et al 1993). Therefore, Africare lacked information on how the production of cassava and sweet potato contributed to reduction of household vulnerability to the impact of AIDS in Zvishavane district. The production of cassava and sweet potato as an AIDS impact mitigation strategy was of interest in this study because cassava is a food crop that is scarcely known and grown by smallholder farmers in Zimbabwe. Sweet potato is not a new crop to many households but it was of interest to know how the improved varieties introduced were of significance to HIV/AIDS affected households. FAO (2003) stated that mitigation strategies should aim to influence one or more of the livelihood assets. It was therefore necessary for this study to explore how the

production of cassava and sweet potato contributed to food security and income of vulnerable smallholder farmers especially the AIDS affected. In addition, the influence it had on the livelihood assets.

Research objective

To explore how the contribution of cassava and sweet potato production to food security and income affects livelihood assets of HIV/AIDS affected households.

Research Questions

Main Questions

1. To what extent is cassava and sweet potato production mitigating the impact of AIDS?
2. What changes are necessary in cassava and sweet potato cultivation to improve its contribution to household food security and income?

Sub-questions

- 1.1 What are the suitable methods of measuring food security of smallholder farmers?
 - 1.2 What is the contribution of cassava and sweet potato to food availability and access in HIV/AIDS affected and non-affected households?
 - 1.3 What are the strategies employed by HIV/AIDS affected and non-affected households to access food?
 - 1.4 What has been the effect of cassava and sweet potato cultivation on livelihood assets?
 - 1.5 What has been effect of cassava and sweet potato cultivation on household labour?
 - 1.6 What is the contribution of cassava and sweet potato to income of HIV/AIDS affected households and non-affected households?
 - 1.7 What are the perceptions of the smallholder farmers on the cassava and sweet potato intervention as an AIDS impact mitigation strategy?
-
- 2.1 What do smallholder farmers perceive as necessary adjustments to cassava and sweet potato cultivation?
 - 2.2 According to Africare, what could be the necessary adjustments to the cultivation of cassava and sweet potato to improve food security and income?

Chapter Two: Literature Review

2.1 AIDS epidemic in Zimbabwe

Zimbabwe is one of the countries in southern Africa that has experienced high prevalence rates of HIV. It has a generalised AIDS epidemic which is characterised by high infection levels among 'high risk groups' and widespread infection among the 'low risk' population (Barnett and Whiteside 2006). This is reflected in the Zimbabwe Demographic and Health Survey 2005-06 which indicated high HIV prevalence ranging from 15% (Midlands) to 21% (Matabeleland South). The trend has shown a decline from 33% in 2001 to 13.7% in 2009 which has been attributed to behaviour change and high mortality rates. The study also showed a higher number of women living with HIV in the age groups 20-24 (16.3%) and 25-29 (28.8%) against 5.8% and 13.1% of men respectively. This could be explained by socio-cultural and economic factors which make women more susceptible to HIV infection. The high HIV prevalence rate on the age group 15-49 for both men and women depicts negative impacts on their productive and reproductive roles.

The epidemic has also contributed significantly to the growing number of orphans. UNAIDS (2008) estimated the number of orphans (age 0-17) at one million. The orphans were indicated to have lost one or both parents. The mortality of the productive age groups due to aids has contributed to demographic changes in households where there has been increased orphan fostering by relatives as well as new category of households (orphan headed).

2.2 Smallholder farming system in Zimbabwe

A farm system is referred to as a household, its resources, the resources flow and their interactions at individual farm level (Dixon, et al 2001). They defined a farming system as a population of individual farm systems that have broadly similar resource base, enterprise patterns, household livelihoods and constraints. In Zimbabwe, the smallholder farming system comprises communal farmers and resettlements. The communal areas are located in marginal agro-ecological zones, characterised by customary land tenure, small land holdings, low use of agricultural inputs and low productivity (Mutisi 2009). After Zimbabwe's independence, the communal areas devoted more land to maize production and between 1983 and 2003, their production accounted for more than 50 % of total maize production.

Other important crops include small grains, ground nuts, sunflowers and cotton. A high proportion of tasks for food production are undertaken by women. Mutangadura (2005) indicated that 'women play a major role in different aspects of agricultural production and most of the activities are typically labour intensive'. The activities include watering, planting, weeding and harvesting. In addition to the field crops, vegetable gardens are cultivated in to supplement field production and for dietary reasons. Livestock plays an important role in providing draught power for tillage and transport, and for dietary reasons (milk and meat). Cattle, goats and chicken are the most common livestock. There is close interaction between crop and livestock production for example animal manure is used to improve soil fertility in crop production and crop residues fed to livestock.

2.3 The sustainable livelihood framework and HIV/ AIDS

The sustainable livelihood framework is used as a tool to assess the socio-economic impact of AIDS on rural livelihoods. The study adapted the sustainable livelihood framework to assess the socio- economic impact of AIDS on livelihoods of smallholder farmers as well as to assess the contribution of cassava and sweet production. The study sought to understand

whether the intervention preserved or strengthened the household asset base through improving food security and income of HIV/AIDS affected households. Improving household food security and income is a way to reduce household susceptibility to HIV infection by preventing risky coping strategies like transactional sex.

According to Ellis (1999) a livelihood is defined as ‘the activities, the assets, and the access that jointly determine the living gained by an individual or household’. It is shaped by different forces and factors that are constantly changing. The livelihood outcomes that households seek are affected by the changing environment and thus alter the strategies they employ to achieve their objectives.

Masanjala (2007) indicated that ‘the household’s livelihood outcomes depend on the interaction of four interlinked dimensions: livelihood assets, the vulnerability context, livelihood strategies and transforming structures and processes’. The four dimensions are illustrated in Fig 1. The vulnerability context consists of shocks, seasonality and trends which people have no control but affects livelihoods. The livelihood assets determine the strategies employed by households to make a living. The assets are owned, controlled, claimed or accessed by the household and form building blocks upon which households undertake production (Ellis 2000).

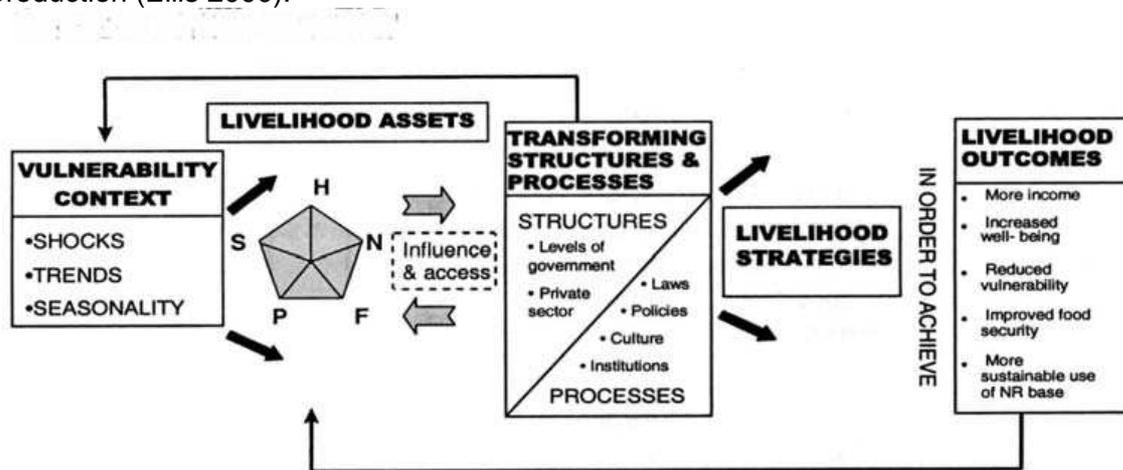


Figure 1: Sustainable Livelihood Framework

Source: Arshley & Carney, 1999)

2.4 Impact of AIDS on food security

HIV/AIDS affects all dimensions of food security: food availability, access and utilization. The food shortages experienced in the Southern Africa region have been linked to the AIDS epidemic. This has been put forward as the ‘New Variant Famine’ hypothesis by (de Waal and Whiteside 2003). In this hypothesis there are four factors which explain why many households in Southern Africa are confronted with food shortages. These are:

- Household labour shortages
- Loss of assets and skills
- The burden of caring for sick adults and children orphaned by AIDS
- Vicious interactions between malnutrition and HIV.

HIV/AIDS related mortality and morbidity undermine household capacity to produce food by primarily affecting labour. Household labour quality and quantity is reduced in terms of

productivity when an individual falls sick and when the supply of labour declines because of patient care and death (Topouzis 2003). The smallholder farming system predominantly relies on household labour which makes the system vulnerable to the impact of AIDS once the household experiences illness and death (Mutangadura and Sandkjaer 2009). The impact of AIDS on human capital is also associated with loss of knowledge and skills related to farm production. A household is more vulnerable to the impact of AIDS if productive roles are gender specific in food production and off farm activities. Therefore when the male or female member dies, the remaining household members would have limited knowledge and skills on activities the household member was engaged in. Barnett and Grellier (2003) added that HIV/AIDS affects food security by reducing household ability to maintain a diverse portfolio of activities, and to produce and buy food. Labour constraints can directly restrict diversification which is one of the strategies that households use to cope with shocks.

AIDS affects social claims that a household can have on support from neighbours and the community. Communities are overburdened and cannot keep pace with demand for support from affected households especially with high HIV prevalence. It also affects household members' capacity to participate in formal organisations impairing household's capacity to access community resources. A study conducted in Zambia showed that female headed households could not participate in the cooperatives and community based organisations because of labour constraints (FAO nd). In situations where AIDS is considered a taboo, disclosure of status might result in isolation and rejection thus removing sources of support vital for a household's livelihood. Community labour sharing agreements for agricultural production are weakened in HIV/AIDS context and exclusion from such groups limits household capacity to produce food.

Food shortages and increased expenses for medical costs can lead to distress sale of productive assets including farm implements. This limits the households' ability to recover from future shocks increasing its vulnerability. In addition, the households may lag behind in future seasons in terms of timeliness of operations for food production. Late planting of maize in Zimbabwe is often associated with poor harvests and households who have lost assets are confronted with food insecurity yearly.

Labour and financial constraints associated with HIV/AIDS related morbidity and mortality often contributes to reduced area under cultivation. Women may lose land after their husbands' death because of customary laws of inheritance where land ownership is ascribed to men.

2.5 Food security measurement

According to FAO (1996) 'food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'. The concept of food security has three dimensions of food security: food availability, access and utilization. Bouis and Hunt (1999) stated that 'physical availability is a function of productive agriculture, effective trade infrastructure and efficient food aid logistics'. De Waal and Tumushabe (2003) explained that the stable quantities are obtained through: own food production (using mainly family labour, land and other resources), food purchase (using household income), using assets that can quickly be turned into food or cash and societal claims through custom and societal structures such as family and community networks. Household food security is determined by the interaction of livelihood assets: human capital in the form of labour with knowledge and skills to produce food, natural (land), financial, physical (implements and tools for use in food production) and social capital can support a household to have adequate food.

Food access reflects whether a household has sufficient resources to obtain food. Access to food at household level depends on domestic production, the availability of income to purchase food, and the availability of both formal and informal sources of food transfers (Mutangadura and Sandkjaer 2009). Under adverse shocks households may lose productive assets in order to access food.

Food utilization is concerned about whether individuals or households make good use of food to which they have access. It focuses on dietary quality: whether households consume nutritionally essential foods, if the food is safe and properly prepared under sanitary conditions so as to deliver their full nutritional value.

At household level Pinstrup-Andersen (2009) defined food security as the ability to acquire the food needed by household members to be food secure. It was therefore highlighted that household food security may not assure food security for all its members for two reasons:

- The ability to acquire food may not be converted into the actual food acquisition. In this case households may prioritize acquisition of other goods and services like school fees and housing over food acquisition
- Intra household allocation of food may not be based on the needs of each individual

With the broad concept of food security it is difficult to have one way that suffices to measure food security. The three dimensions affect the approach used to measure food security of households. Pinstrup-Andersen (2009) indicated that the total household income and food prices give an estimate of household food security with the assumption that the household spend the money on food. Maxwell (1996) cited two methods: estimate of gross household production and purchases of food over time, estimate growth or depletion of food stocks held over a period of time and presume that the food that has come into the household possession and 'disappeared' has been consumed and; use of 24hr recalls and analyze the calories (important for nutritionists). However, Maxwell (1996) also explained the use of indicators which analyse use of and reliance upon strategies for dealing with insufficiency of food at household level as direct indicators of food security. The strategies may include short term dietary changes, reducing ration sizes, altering household composition, altering intra-household allocation of food, depletion of stores, increased use of credit for consumption purposes, increased reliance on wild foods, short term labour migration, short term alteration in crop and livestock production patterns, pledging, and sale of assets.

The study used the food produced per farm and its depletion over time to show the importance of different crops as food sources across the year. It was also important not to only understand about food produced on the farm but to understand the coping strategies of both HIV/AIDS affected and non-affected when the harvested crops were exhausted.

2.6 Household income and the impact of AIDS

The total household income is disaggregated into three categories namely farm income, off-farm income and non-farm income. According to Ellis (2000) the three categories are defined as follows: Farm income refers to income generated from own-account farming on owner occupied land or land accessed through cash or share tenancy. Off-farm refers to wage and labour on other farms within the agricultural sector. Non-farm refers to non-agricultural

income sources including rural wage labour, self employment, remittances and urban transfers to rural households.

HIV/AIDS reduces on-farm and off-farm household income particularly availability of disposable cash, while it also increases household expenditure (Topouzis 2003). Bollinger et al, 1999 showed that income losses experienced by the household starts when a member begins to suffer from HIV-related illnesses. The household member cannot be fully engaged in productive activities limiting the members' contribution to farm income. Death causes permanent loss of the member's contribution to farm income. One of the major findings revealed in a study conducted for the Food Agriculture and Natural Resources Policy Network (FANRPAN) (Mano and Matshe 2006) in two districts in Zimbabwe is that 'HIV/AIDS has significantly affected food security of rural households' primarily through negative impact on remittance income'.

Harvey (2004) showed that HIV/AIDS related morbidity and mortality affects financial capital of households through loss of remittances, access to credit and less capacity to grow cash crops. Remittances are quite useful to support agricultural production especially in purchasing inputs and hiring labour. In a study conducted in 1999 near Zvishavane town, Zimbabwe (Drinkwater 2003) reported a major finding of urban remittances supporting agricultural production. Illness and death of productive age working in urban areas cuts off the support and reduce household capacity to procure inputs.

Loss of access to credit is also experienced by households as the impact of AIDS limits household's capacity to repay loans. This is associated with riskiness involved with repayment of loans as HIV/AIDS affected households are often struggling. Masanjala (2007) mentioned that households can use up all their savings and end up taking additional debt at penal rates of interest. However, households end up in distress sale of productive assets after failure to repay loans often given at high interests. This is a destructive way to respond as it may lead to household destitution.

The epidemic disproportionately affects women, (Mutangadura 2005). It is associated with increased workload of women affecting their role in agricultural production and securing livelihoods. The time spent caring for the sick and orphans could be used for pursuing other non-farm income generating activities. Therefore, the increased burden on women results in a decrease in women's contributions to household income.

Households affected by morbidity and mortality lose income, assets, skills and those with a chronically ill member have average reductions in yearly income of 30-35% (de Waal and Whiteside 2003). The expenditure patterns of households change with increased demands associated with HIV/AIDS related morbidity and mortality. Medical expenses and funeral costs and might be met through loans and distress sale of assets. Households reduce their expenses on agricultural inputs and results in changes cropping patterns as households shift to low input crops. In addition, school dropouts are increase with decreased expenditure on education.

2.7 Household responses to the impacts of AIDS

Households respond to external shocks and adopt coping strategies that generate the means of household survival (Ellis, 2000). The household coping strategies are adapted sequentially from reversible mechanisms to destitution (Mutangadura et al 1999). Although several literatures indicate that households are coping when they respond to the impact of HIV/AIDS, Loevinsohn and Gillespie (2003) argued that the responses of households reflect

that they are simply not coping. They added that distress sale of assets, long term impacts of withdrawing children from school and permanent impoverishment of households show their response to the shock but they are not self sufficient to recover from the shock. For this reason households are termed 'responding' and not 'coping'.

Barnett and Whiteside (2006) referred to the first response adopted by farming households as 'down shifting' measures changing the number and range of crops grown. Jayne et al, (2005) explained that households shift towards less labour intensive crops such as cassava or sweet potato and away from more labour intensive (high-value) cash crops. A study in Uganda revealed that households shift from banana and ground nut farming system to cassava/sweet potato farming system labour extensive but less preferred crops (Hunter, Bulirwa et al. 1993). Jayne et al, 2004 added that AIDS affected households simultaneously incur losses in capital assets making it difficult to shift to more capital technologies in response to labour shocks.

Household responses falls under three categories: improving food security, raising and supplementing income and alleviating labour loss. Wieggers (2008) highlighted that 'many households are forced to cash their savings and sell their food crops, livestock or even farm implements in order to cover medical care and funeral expenses'. To raise and supplement household income households may diversify income through craft work, tailoring and petty trading.

Some of the responses to labour constraints households are reduced area under cultivation, change in cropping patterns to less labour intensive practices, lengthen the working day, labour reallocation, labour exchange with neighbours and having an additional relative to assist with farm production, housework or child care. In some cases children are withdrawn from school to assist in household chores and farm labour. Withdrawing children from school has a long term impact compromising their future livelihood options which might increase their susceptibility to HIV infection.

2.8 Cassava and sweet potato production in Zimbabwe

Cassava and sweet potato are grown at a limited scale in Zimbabwe despite their potential to contribute towards food security and income of smallholder farmers. The major sweet potato production zones are in Natural Region I, II and III with region III receiving less rainfall and characterised midseason dry spells. However, sweet potato has not been recognized at national level and this is reflected by its absence in the Zimbabwe's national statistics as well as national programs that promote the crop (Mutandwa 2008). It has increasingly become an important crop in urban and rural areas because of the high costs of confectionary products. Loebenstein and Thottapilly (2009) reported significant production levels of sweet potato occurring in the peri urban area surrounding the capital city of Harare. The production of sweet potato has historically been associated with women grown in the backyard, thus referred to as a 'women's crop'.

Manzungu (no date) indicated that smallholder farmers prioritise planting maize, groundnuts, cotton and sorghum at the beginning of the rainy season. Sweet potato is therefore planted later in the season when other crops have already been established and mostly grown without application of inorganic fertilisers. The production levels of sweet potato in Zimbabwe (10,000tons) contrast the growth in production in other Eastern, Central and Southern African countries which ranges from 340,000 to 1,000,000 tons per year (Mutandwa 2008). Loebenstein and Thottapilly, (2009) reported that the major sweet potato growing African

countries showed a positive and significant growth from 1961 – 2006, Nigeria (7.3%), Tanzania(3.2%), Uganda, Kenya and Rwanda(2.7% each).

In a study conducted in Wedza district, Mashonaland East use of tissue cultured sweet potato varieties was shown to improve food security. Varieties like Brondal yielded as high as 25t/ha against national average of 6t/ha (Mutandwa 2008). With the high yields, it was noted to improve the livelihoods of smallholder farmers through purchase of assets using income obtained from the crop.

Cassava was first associated with immigrants from Malawi, Mozambique and Zambia and their varieties took long to mature (15 to 18 months). It is a crop with potential for both domestic and industrial use including stock feeds. The recognition of cassava resulted from recurrent droughts and economic production of the crop. The International Institute of Tropical Agriculture (IITA) recommended cassava in Zimbabwe as an alternative crop to maize after the 1992/1993 drought which severely affected maize production (Babaleye 1996). It was added that extension services would play an essential role in facilitating the spread and adoption of the crop.

A case study conducted in 1995 on cassava revealed that it had high potential for increasing diversification in Zimbabwean agriculture and farmers were motivated to grow the crop for food security and cash reasons (Kleigh 1995). However, most areas lacked information about the crop. The results of this study indicated that cassava had a more net income per Labour Day in comparison to cotton which was a major competing crop. However, it was noted that the small land holdings of smallholder farmers gave them little room to experiment or try out the new crop.

Cassava can grow and give reasonable yield in soils of low fertility but fertilizer is often required for the crop to reach its maximum potential. Farmers facing challenges of soil infertility and unable to procure inorganic fertiliser could grow cassava as an alternative crop (Kamukondiwa 1996). Cassava can be intercropped with maize and sorghum which makes it fit within the existing cropping systems. It takes longer to mature than annual crops and requires protection from domestic and wild animals. Cassava production trends showed that East and Southern African countries had increase in production of the crop but Zimbabwe reflected the lowest production levels, FAO 1998 as cited in Hillocks (2002). The Table 1 below shows cassava production trend from 1996 to 1998.

Table 1: Cassava production trends in Eastern and Southern African countries

Country	Yield (1998) t/ha	Production (1000 million tons)		
		1996	1997	1998
Zimbabwe	4,231	150	160	165
Zambia	4,951	620	702	817
Tanzania	8,933	5,992	5,704	6,193
Malawi	2,778	190	200	200
Kenya	9,286	880	900	910
Uganda	6,681	2,245	2,291	2,285

Source: Adapted from FAO, Production Yearbook, Vol. 52 (1998) cited in Hillocks (2002)

Kamukondiwa (1996) indicated that the adoption of cassava by communal farmers in areas that are marginal for maize production would reduce government expenditures on food rations for these areas. Maize production had remained a key staple crop under production in marginal areas despite recurrent droughts affecting production. Therefore, production of

cassava was mostly centred on the adoption of the crop by farmers who were experienced with maize monoculture.

Hillocks (2002) highlighted that cassava production is dependent on adequate supply of vegetative propagules (stem cuttings). Thus, in new areas, the production of planting materials in sufficient quantity is a major restriction to the widespread and rapid adoption of the crop. Its multiplication rate is low; the planting material is bulky and perishable, and distribution is expensive in comparison with conventional seed services. Healthy cuttings are an important factor for attainment of higher yields. Apart from having adequate planting material, (Hillocks 2002) added that though there is evidence of cassava expanding into the semi arid areas, the available of germplasm is mostly adapted to the lowland humid tropics. This affects the potential of the crop in drought prone areas if the supplied varieties are best suited to humid conditions.

Agri-Biotech (Zimbabwe) has developed tissue cultured varieties of cassava and sweet potato. Smith (2004) reported that planting material from Agri-Biotech was available in 8 districts out of the 56 districts of the country. This indicates limited supply of planting material. In relation to HIV/AIDS responses in Zimbabwe, Smith (2004) mentioned that the Swedish Centre contracted Agri-Biotech to deliver planting material to 1,000 beneficiaries who were disadvantaged orphans and the elderly who had lost the middle generation to HIV/AIDS. The impact of cassava and sweet potato production by these beneficiaries was not captured in the report. According to (Africare 2007) report, the organisation established 32 hectares of cassava by September 2007 and the crop was reported to have improved food security of households.

2.9 The role of cassava and sweet potato in AIDS impact mitigation

Agricultural and rural development responses to the epidemic are meant to reduce household vulnerability to the impact of AIDS and reducing susceptibility to HIV infection. Wiegiers (2004) indicated that an important role of the agricultural sector is reducing the spread and impacts of AIDS by contributing to poverty alleviation in rural areas. For example, improving food security reduces risky coping strategies like transactional sex. Economic Commission for Africa (ECA) 2006 stated that 'mitigating the impact of HIV/AIDS on smallholder agricultural production and rural livelihoods need to assist households cope with and recover from stresses caused by HIV/AIDS and maintain or enhance their capabilities to produce food, generate income and protect their assets'. FAO (2003) added that mitigation strategies should aim to influence one or more of the livelihood assets.

Cassava and sweet potato intervention is among several responses to the epidemic which include nutrition gardens, small ruminants (for consumption, sale or manure), and labour exchange arrangements, distribution of seeds and inputs, and nutrition education. Labour constraints faced by smallholder farmers resulting from HIV/AIDS related morbidity and mortality have resulted in labour saving technologies being promoted. Cassava and sweet potato are labour extensive crops in comparison to maize. In Uganda a study revealed that HIV/AIDS affected households were shifting from banana and groundnut cropping system to cassava and sweet potato (Hunter et al 1993). Gillespie and Kadiyala (2005) and (Mather et al 2005) argued that the two crops reduces peak labour demands but their low nutritional value have potential costs to health if they form bulk of the diet over an extended period. This is supported by Loevinsohn (2008) who also indicated that if these crops are relied on in excess they undermine nutrition.

De Waal and Whiteside (2003) stated that ‘cultivation of cassava is a sign of impoverishment as households shift from high value and nutritious crops such as cereals and oilseeds’. It was expressed as reversal of previous agricultural development gains.

Nweke et al, 2004 indicated that cassava’s flexible planting and harvesting calendar enables households to fit in labour requirements around other operations. They added that flexibility makes cassava to be one of the easiest crops for labour constrained HIV/AIDS affected households. This is supported by (Mutangadura and Sandkjaer 2009) who stated that ‘labour saving technologies such as promotion of cassava and sweet potato production and small scale irrigation are being promoted as a key mitigation strategy for households experiencing diminished labour supply as a result of HIV/AIDS’. However, Bonnard (2002) stated that ‘when labour resources are affected the introduction of less labour intensive crops and cultural practices is immediately considered an appropriate solution’. It was added that replacing maize with cassava increases labour for processing. In contrast, a report by FAO (2006) for Zambia revealed that Structural Adjustment Programmes in the early 90s resulting a continued decline in maize/fertiliser price ratios and subsequent shift to cassava. The high prevalence areas had a little increase in the cultivation of cassava and sweet potato. The above scenario indicates that AIDS is not the only factor contributing to shifting cropping patterns and decline in maize production. Topouzis (1999) indicated a knowledge gap on the degree to which low-input agricultural production systems offer solutions to constraints facing households affected by HIV/AIDS. Are cassava and sweet potato production systems a solution to constraints faced by HIV/AIDS affected households?

2.10 Conceptual Framework

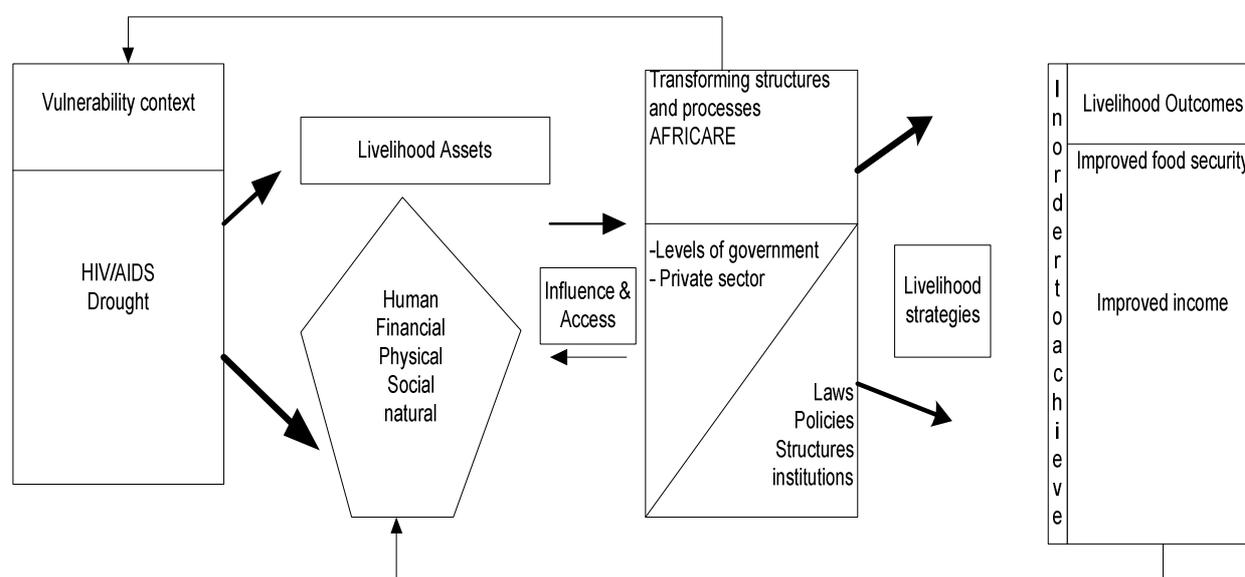


Figure 2: Conceptual Framework

The sustainable livelihood framework was adapted in this study to make an analysis of the impact of AIDS on the livelihood assets of smallholder farmers and analysis of the intervention implemented by Africare. Africare is a non-governmental organisation in the transforming structures component of the Sustainable Livelihood Framework. The cassava and sweet potato intervention by Africare is assessed as an alternative strategy by farmers

in the 'livelihood strategies' of the sustainable livelihoods framework. This livelihood strategy was assessed in order to evaluate its contribution to improve food security and income, 'livelihood outcomes'. The livelihood outcomes of food security and income influence the livelihood assets of the farmers. HIV/AIDS and drought are the vulnerability context, they affect the livelihood assets as well as influence the strategies used by farmers in order to achieve livelihood outcomes. The project implemented by Africare was analysed with this framework to show the contribution of the project in reducing the farmers' vulnerability to the impact of AIDS and its impact on reducing the farmers' susceptibility to HIV infection.

2.11 Definition of Concepts

Food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO 1996)

A household is food-secure when all of its members have, at all times, access to food of a quantity and quality consistent with an active and healthy life. (Bouis and Hunt 1999)

Livelihood: 'the activities, the assets, and the access that jointly determine the living gained by an individual or household'. (Ellis 2002)

Susceptibility: the likelihood of a person becoming infected by the human immunodeficiency virus (HIV) Loevinsohn(2008)

Vulnerability: the likelihood of a person suffering significant impact as a consequence of HIV infection and AIDS-linked illness or death. Loevinsohn(2008)

AIDS impact mitigation: reducing loss of life and property by lessening the impact of AIDS

Chapter Three: Methodology

3.1 Study Area

The study was conducted in Zvishavane district located in Midlands Province where Africare promoted the production of cassava and sweet potato. Cassava was a newly crop introduced to smallholder farmers whilst sweet potato is a common crop grown but the organisation facilitated for the availability of improved varieties. The project was implemented to improve food security and income of smallholder farmers including HIV/AIDS affected households.

The area receives moderate rainfall (450-650mm) which is characterised by mid season dry spells (FAO 2006) which makes it marginal for maize production. The main staple crop grown is maize. The region is suitable for the production of groundnut and sunflower as cash crops. The Zimbabwe Demographic Health Survey for 2005-2006 showed that the Midlands province had a HIV prevalence rate of 16% (CSO 2007). Currently, Zvishavane has an HIV prevalence rate of 19% and several households have been affected by HIV/AIDS through illness, death or caring for orphans.

3.2 Research population and sampling

In total 2500 households were beneficiaries of the Midlands Food Security and HIV project. The research population are smallholder farmers facing several challenges in food production including insufficient rainfall, inputs (fertiliser and seed), labour and draft power. The impact of AIDS on smallholder farmers made the distinction between HIV/AIDS affected and non-affected households in the study. The HIV/AIDS affected households were households caring for chronically ill person(s), orphans or those which had experienced death of member(s) from HIV/AIDS related illness. The three categories in the HIV/AIDS affected were expected to yield differences in the impact of AIDS. Non- affected households were households that had not experienced illness or death related to HIV/AIDS. This grouping resulted in four categories which were used for data collection as well as analysis.

The study sample had smallholder farmers (respondents) and, extension workers and representative of the Midlands Root and Tuber Association (informants). A total 16 respondents were selected in Zvishavane district for the purpose of information diversity in the four categories. Purposive sampling was done for the selection of the HIV/AIDS affected and non affected households with the aim that they would provide detailed information with regards to the cassava and sweet potato production and its impact on their livelihood.

The agricultural extension workers were selected on the basis of working in partnership with Africare during the implementation of the project and also worked closely with farmers. The root and tuber association was formed for the purpose of project sustainability and also serves the purpose of marketing cassava and sweet potato products. There was purposeful inclusion of a representative from the association for detailed information on cassava and sweet potato production, adoption of the crops and perceptions on the project with regards to improving food security and income.

Use of records of beneficiaries of the Midlands Food Security and HIV project was the starting point. The project had two components food security and Home Based Care for people living with HIV/AIDS (PLWHA). This facilitated the guidance of the Voluntary Care Giver who was knowledgeable about the households that received cassava and sweet

potato planting material for the purpose of identifying the households that could be interviewed in the records as well as to categorize them.

In summary the following table shows number of households interviewed and their categories with regards to AIDS impact.

Table 2: Summary of households interviewed and categories

Household category	Number of households
Affected with chronically ill	3
Affected with death	6
Affected with orphans	4
Non-affected	3

The major challenge faced in selection of households to interview for this study was the identification of HIV/AIDS affected households who were cultivating both cassava and sweet potato. A decision was made to interview households that received cassava and sweet potato planting material as beneficiaries of the project and explore the reasons for cassava not being cultivated.

3.3 Data collection

The data collection for this study was done in three ways: in-depth interviews, direct observation and use of Africare project reports. Interviews were done using a checklist and focused on the following areas:

3.3.1 Impact of AIDS livelihood assets

The data collected focused on the five capitals: natural, physical, financial, human and social capital. This information was collected to bring out the socio-economic impact of HIV/AIDS related illness, death or orphan care on the household. This would also be useful in data analysis to show the changes that occurred resulting from cultivation of cassava and sweet potato.

3.3.2 Crops grown and area under cultivation

The study adapted a Participatory Rural Appraisal (PRA) tool (resource map) to capture agricultural lands (crops grown and their locations). The resource map is a tool that helps to learn about a community and its resource base (FAO 1999). The use of mapping to collect data for area under cultivation and crops grown by the household was found to be quite useful. The respondent actively participated by drawing the map. It was important to have the map drawn as a way to start of the interview as it gave a pictorial view of the farm and the land under cultivation of each crop. This showed land utilization by households with the recognition that it is a natural capital without which farmers would not produce food. It was interesting to note that the households could not immediately provide information about the size of their farms and area under cultivation. Using the map estimations of area under

cultivation for individual crops; and the estimation of the land that was uncultivated (if any). In total this gave information about the size of land and area that was under each crop. The process of drawing a map and estimation of area under cultivation for each crop took 30-45 minutes. The key crops for the study were maize, sweet potato and cassava and additional crops were grouped under other crops. These crops included sunflower, sorghum, groundnut, soyabean. The information placed on the map was laid as a foundation for further probing regarding information required to answer the questions that were considered in the study. The information collected after drawing the map included:

- The crops that households had stopped growing after introduction of cassava and sweet potato.
- The change in area under cultivation after the introduction of cassava and sweet potato.

The map also found to be useful to cross check information especially when recording information on the harvested crops. It also served as a reminder for extraction of information about various crops grown on the farm. The respondents further explained how they produce the crops including labour allocation, use of fertilisers and production constraints. The production constraints would also reveal other external factors that are affecting food production. The households also explained the reasons for uncultivated land on the farm and it also showed the influence of HIV/AIDS related illness and death or orphan care giving.

3.3.3 Use of the harvested crop

The details on harvested crop utilisation provided an understanding on how the crop actually contributes to household consumption. This was in the form of a budget where the different crops were indicated as whether consumed or sold. Information on marketing of crops would show how the crop contributed to household income. This resulted in probing the household to explain the reasons for sale or retaining the crops. There was the expectation that from the explanations the household show HIV/AIDS influence on the decisions taken by the household. To obtain data on whether the food from production was adequate for the household the respondents were asked to indicate the months that the crop would suffice their needs from the time they harvested. It was clear to see the months which the household would have exhausted their crop. Probing was done for the respondents to explain the households' coping strategies for the crop to cover the stated period as well as to access food for other months when food was exhausted. This information would indicate the severity of food insecurity and would yield an understanding of food availability and access in the household.

The households' strategies for dealing with food insecurity yielded data on the sources of income which were important for the household. It would also show the strategies that make the households even more vulnerable to the impact of AIDS.

Perceptions about the cassava and sweet potato intervention

Apart from understanding the food security and income of the households the respondents also had to express their opinions on the cassava and sweet potato intervention in addressing their needs. Furthermore, gaps which were identified with the cultivation of cassava and sweet potato in the area. This would provide information on gaps of the intervention according to the view of the beneficiaries of the project.

3.3.4 Data triangulation

The key informant interviews had to extract information on the impact of AIDS on food production in the area, the changes in food production and income after introduction of cassava and sweet potato. The informants also gave their perceptions of the project and the gaps they identified with the intervention.

The interviews were done at the respondents' homestead and it made direct observations possible.

In addition to the in-depth interviews and direct observations, Africare project reports were consulted for triangulation reasons as the implementer of the project.

3.4 Data analysis

The data was clustered according to four household categories as indicated in the Table 2. The sustainable livelihood framework was adapted for data analysis on the socio-economic impact of AIDS on the households as well as the impact of cassava and sweet potato production. The focus was to analyze the vulnerability context which showed the external forces that were weakening the livelihood of farmers. The socio-economic impact of AIDS was analysed under the five livelihood capitals. The livelihood strategies would show the farmers are using their assets to make a living. On the livelihood outcomes the study focused on food security and income sources of the households. The impact of cassava and sweet potato production was judged against the influence it had on food security and income as livelihood outcomes; in addition how it influenced household livelihood assets.

The table below shows the aspects that were considered for data analysis as sections of the sustainable livelihood framework.

Table 3: Sustainable Livelihood Framework: tool for data analysis

Component of the SLF	Aspects considered in data analysis
Vulnerability context	Drought, HIV/AIDS
Livelihood assets	Financial- loans, savings, income sources and expenditure patterns Natural – land (area under cultivation and crops grown), forests, fertiliser use Human – illness or death of household member, orphans, education Social – caring for orphans, membership in farmers association and other social groups, linkage to organizations working in the community Physical- farm implements, housing, livestock
Transforming structures and processes	Africare
Livelihood strategies	Migration Cropping and livestock rearing Off-farm activities
Livelihood outcomes	Food security and improved income

This yielded detailed information regarding the impact of AIDS on the households, strategies employed by households and their current food security situation. In addition perceptions of farmers and key informants concerning the cassava and sweet potato intervention as AIDS impact mitigation strategy were analyzed. This provided explanations for some findings

covered in the sections of the sustainable livelihood framework. This also formed a foundation for the suggestions of farmers and key informants with regards to cassava and sweet potato production.

Chapter Four: Results

4.1 Vulnerability Context

HIV/AIDS and drought are the major threats to the livelihood of smallholder farmers in Zvishavane district. The last cropping season had an extensive dry period from December to February which resulted poor harvests for maize. Of the 16 households interviewed 62.5% did not harvest maize. The interviewed households and the extension workers showed drought was a common phenomenon which has made the area marginal for crop production.

The introduction of cassava and sweet potato was an opportunity for crop diversification to reduce the risk of total crop failure. However, it was highlighted that drought also contributed to the poor establishment of cassava in the area. Hillocks (2002) indicated that the expansion of cassava into semi-arid areas is not supported with germplasm (varieties) that is adapted to such areas. The indication was that the available planting material in most countries is well suited to more humid areas. Considering the erratic rainfall in Zvishavane there is great possibility of the planting material not suited to the area. Furthermore, HIV/AIDS related illness and death were reported to have reduced capacity of households to produce food through loss of labour, farm implements and draft power.

4.2 Impact of AIDS on livelihood assets of smallholder farmers

4.2.1 Financial capital

HIV/AIDS eroded households' savings as well as limited household's access to loans. Livestock sales resulted from the need to meet medical expenses, transportation costs and funeral costs in cases of death. The households caring for chronically ill persons indicated having no financial savings at the time of the study. The livestock sold included cattle, goats and poultry however, cattle sales were indicated to be last option when all other sources were depleted.

Loss of formal jobs resulting from long time chronic illness were experienced and resulted in complete loss of regular income. Though households in the category affected with death had no chronically ill members at the time of the study, their livestock and savings were eroded when they cared for household members who are now deceased. Transportation to hospitals, medical and funeral costs contributed to the sale of poultry, goats and cattle.

Caring for orphans increased household sizes and required a greater expenditure on food and education. Payment of school fees was identified as the major challenge for orphan caring households; it contributed to the sale of small livestock like poultry and goats.

4.2.2 Physical capital

Farm implements such as ploughs and cultivators were poorly maintained with the loss of male labour to sickness. The observation made during the study was that non-affected households had well maintained farm implements and the houses were in a better condition than the HIV/AIDS affected households. The expenditure of non-

affected households showed investment in building households' asset base which contrasted HIV/AIDS affected households e.g. a non-affected household sold cattle to build a house whilst HIV/AIDS affected households showed distress sale of cattle for medical, transport and food needs.

The immediate demands for money resulted in the disposal of farm implements and tools for example wheel barrows, hoes, ploughs, ox-drawn carts. 16% of the households with chronically ill sold an ox-drawn cart to meet medical expenses and household food requirements. The study showed that households that had chronically ill persons and those affected with death lost more assets than household caring for orphans. The loss of physical assets was progressive and worsening with time, and the loss of cattle and farm implements showed little chances of households managing to replace them.

4.2.3 Social Capital

All HIV/AIDS affected households indicated limited assistance from the close relatives and neighbours. However, the study showed that HIV/AIDS affected households especially those with chronically ill depend on social support. It was indicated in 16% of the households with chronically ill that income from craft work was maintained because of support from neighbours to sell crafts in Zvishavane town. However, it was different for a household that was shunned by neighbours and relatives which constrained it from getting assistance.

Irrigation is a labour intensive task which households facing labour constraints due to illness would not manage to grow vegetables. Community gardens in Zvishavane required that a household would cultivate crops according to the schedule set by the members. The area for cultivation is equal for all households, however this led to eventual exclusion of household with chronically ill which had no members available to attend the community garden meetings and for irrigation.

Two chronically ill women were indicated to have been returned to their parents for care. It was found to have caused social and economic burden on elderly parents who had to care for the women and their children.

Labour sharing agreements among households with chronically ill persons and those caring for orphans were reported to be quite important for maize planting. The teams were made up of households with no draft power in the chronically ill category. In the households caring for orphans one household reported that they team up combining draft power with other households for the purposes of land preparation. It showed that households with similar constraints or resources teamed up to support each other.

Caring for orphans was reported to reduce participation of orphan care givers in the Lending and Savings Clubs. It led to failure of repayment of loans because the loan was used to buy food instead of being invested to generate more money. Failure to meet deadlines of loan repayments made the household to be excluded from the group and eventually lost access to loans.

4.2.4 Human Capital

HIV/AIDS related illness and death predominantly affects the productive age group which leads to labour constraints. Labour loss was indicated to be through illness of a member as well as reallocation of labour to care for the sick person. The loss of labour was not homogenous across the HIV/AIDS affected households. One household in the chronically ill category indicated to have lost four members to death resulting from HIV/AIDS illness. It showed the clustering effect of AIDS on households. Labour is lost for agricultural activities and non-agricultural activities which reduces households' capacity to obtain income.

Though several households across all categories strive to send children to school, two households withdrew children from school as a result of failure to meet educational costs. In such scenario, girls were reported not to reach secondary school education.

4.2.5 Natural Capital

All households interviewed had access to land for crop production and all households affected by HIV/AIDS highlighted that their area under cultivation had progressively declined because of loss of labour, loss of draft power and inability to purchase inputs. One household with chronically ill indicated that the area under cultivation had not declined. However, it was noted that the household was not allocated a farm because the household head (female) was brought back to her parents when she became chronically ill. Customarily, women were not allocated fields when they return to their parents and it constrained the household's access to land.

All HIV/AIDS affected households had access to the forests close to their homesteads for firewood. However, continued deforestation has depleted the resource resulting in people travelling long distances (6-10km) to privately owned farms to fetch firewood. Firewood sell became an important source of income; however there was concern over continued deforestation in the area which makes this source of income unsustainable. Women were indicated to be burdened with fetching firewood for sell.

4.3 Effect of cassava and sweet potato production

4.3.1 Area under cultivation and crops grown

All household categories had the largest area under maize production followed by the crops grouped in this study as 'other crops'. The group had a variety of crops including sorghum, soyabean, sunflower, roundnuts, groundnuts, finger millet and pearl millet. The following table shows the total farm area, area under cultivation and crops assigned to them.

Table 4: Area under cultivation and percentage of crops grown

Household category	No of respondents	Total farm area (acres)	total area under cultivation %	% of the cultivated area			
				maize	sweet potato	cassava	other crops
affected with chronically ill	6	42.75	49	59	6	0*	35
affected with death	3	22.5	52	51	6	0*	43
affected with orphans	4	28.75	77	49	10	0	41
non-affected	3	28.75	100	56	8	0*	36

*indicates households had cassava but the cultivated area could not be estimated in acres.

The data shows that the households with chronically ill persons had the lowest area under cultivation. Two households in this category had 25 % of the total land area under cultivation. These households cultivated crops close to the homestead because it allowed the members of the households who were not ill to attend the chronically ill persons. The households in this category cited the reasons for low area under cultivation which included inadequate inputs (especially for maize), lack of draft power, lack of planting material (sweet potato) and labour constraints. Sweet potato had the lowest area under cultivation in comparison to maize and other crops. Cassava was under a very small area in the community gardens of which a household would own a few plants. Two thirds of the households indicated that they had stopped sorghum cultivation because of its high labour requirements for processing.

The households in the category affected by death also had more land allocated to maize and lowest under sweet potato. Cassava was grown by none of the households and the major constraint was accessing the planting material. The observation made on these households was the diversity of crops; a wider range of crops were grown in comparison to households with chronically ill persons. Two thirds of the households who were female headed had the lowest area under cultivation with less than 40% of their land was under cultivation. The households in this category had relatively low area under cultivation.

Households caring for orphans had higher land under cultivation than households with chronically ill persons and affected with death. The largest area was under maize showing similarity with other categories and none of the households grew cassava in the past season. The households grew the same range of other crops as households affected with death. The major variation was noticeable with an elderly headed household which cultivated only at the homestead and left out the major field. The orphans were young and had to spend more time caring for the orphans than agricultural activities. The households with older orphans had higher area under cultivation.

The non-affected households had all their farm land under cultivation and maize was allocated the largest area as other household categories. Only one third of the households grew cassava in the last season, a few plants bordering the sweet potato field as indicated in Figure 4. These households had draft power, and also used surplus grain during the planting season to exchange for labour. The households also grew a wide range of crops soyabean, sunflower, finger millet, sorghum, roundnuts and groundnuts.

As observed from the maps drawn cassava and sweet potato are grown close to homestead or in the community gardens. Figure 3 and 4 shows the area under cultivation and crops grown by a household with chronically ill and a non affected household. The gardens are fenced to protect the crops from domestic and wild animals. Interviews with the root and tuber association and extension workers yielded that insufficient plant material restricted significant change to area under cultivation. Households affected by HIV/AIDS members spent more time away from agricultural activities especially those caring for chronically ill persons.

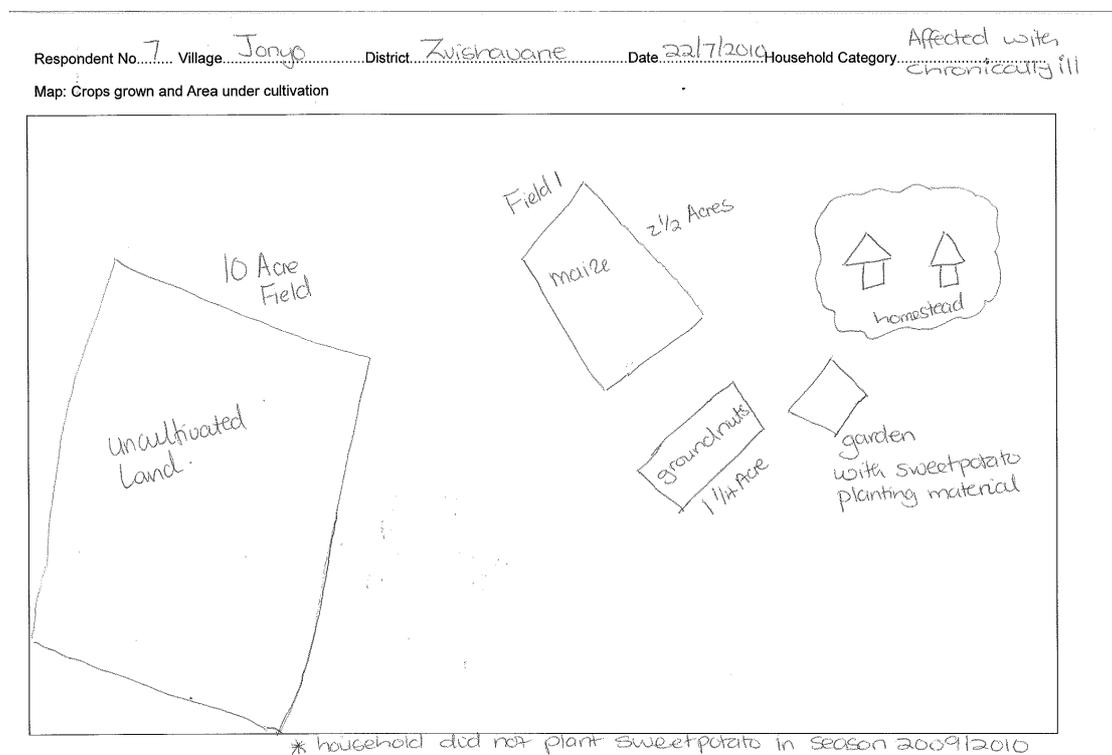


Figure 3: Example area under cultivation for a household with chronically ill

Respondent No. 7 Village. Mbelenguba District. Zvishavane Date. 24/07/2018 Household Category. Non-affected

Map: Crops grown and Area under cultivation

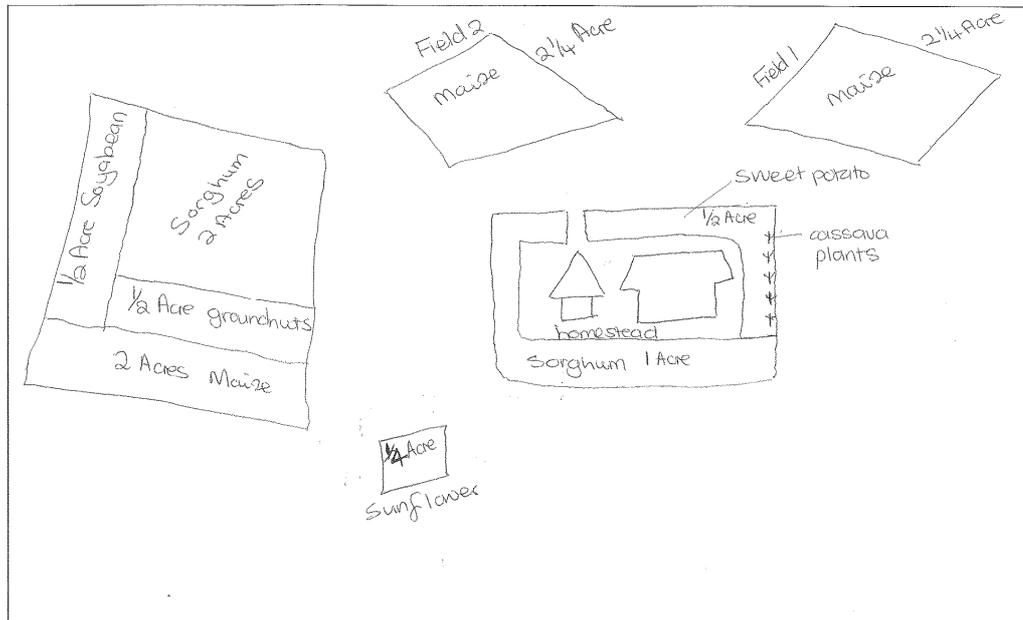


Figure 4: Example area under cultivation for non-affected household

As shown in Table 4, sweet potato and cassava occupies the lowest area under cultivation in comparison with maize and other crops. The changes in area under cultivation as a result of the introduction of cassava were minimal. However, households that were no longer cultivating sorghum highlighted that sweet potato was considered as an option. The households across all categories added sweet potato but maintained the range of crops that were grown before the introduction.

4.3.2 Household labour allocation

Labour allocation for sweet potato production showed that most of the tasks were done by women in all categories. Men were indicated to take part in land preparation and planting in one third of the households with chronically ill. In all the non-affected households men were involved in land preparation. Planting, weeding and harvesting were tasks which were indicated to be undertaken by women in all household categories. The following graph (Figure 3) shows labour allocation for sweet potato production in the four household categories

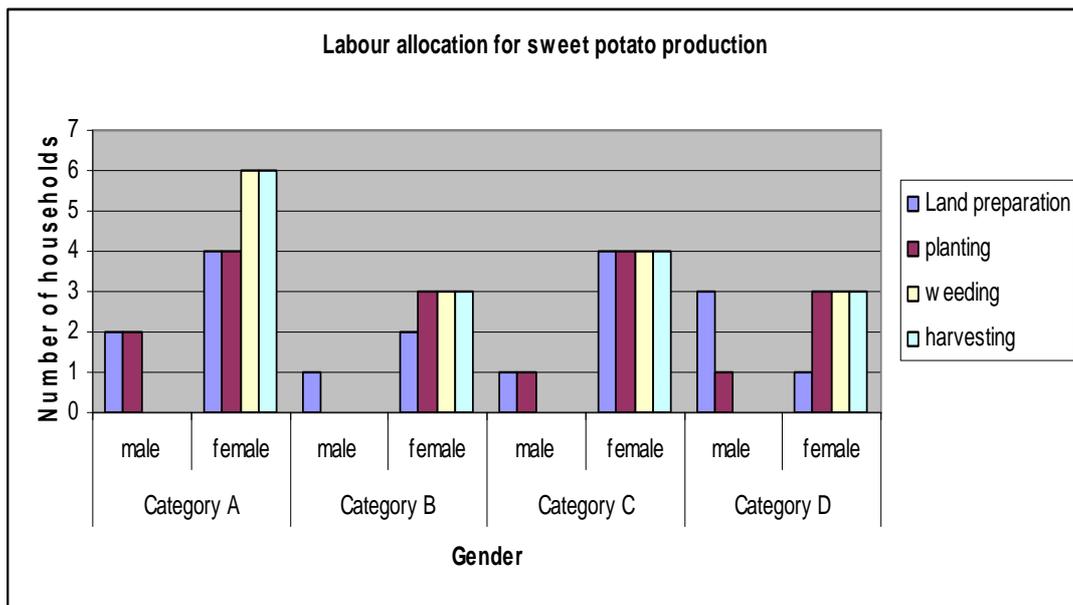


Figure 5: Labour allocation for sweet potato production

- A: Affected with chronically ill
- B: Affected with death
- C: Affected with orphans
- D: non- affected

Cassava labour allocation was biased towards women but the scale of production was quite low to for households to provide meaningful information.

4.3.3 Food availability

Households in the four categories provided information on the amount (kgs) of food produced for the crops that were under cultivation in the 2009/2010 cropping season. The households indicated the period they expected the crop to be depleted (in months). This resulted in the drawing of a food availability calendar as shown in Figure 3. The calendar focused on three crops: maize, sweet potato and cassava.

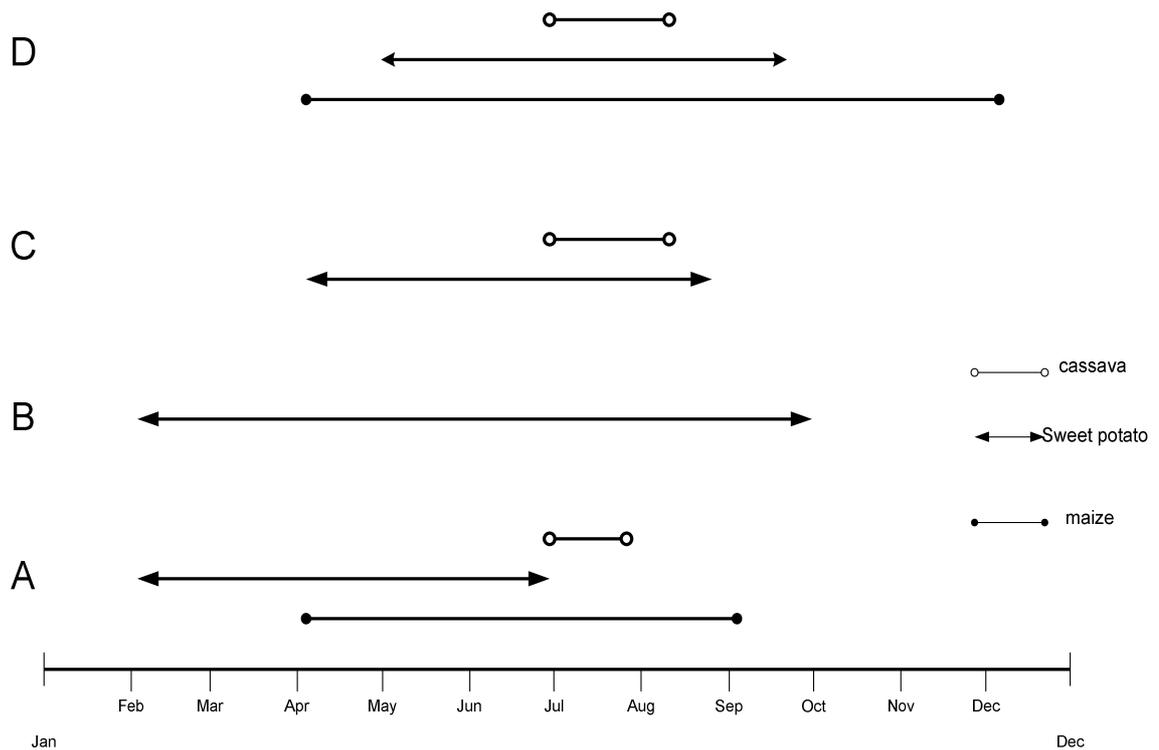


Figure 6: Food availability calendar for maize, cassava and sweet potato

- A: Affected with chronically ill
- B: Affected with death
- C: Affected with orphans
- D: non- affected

Households affected by death of members to HIV/AIDS related illnesses did not harvest maize from the past cropping season. Insufficient rainfall with poor distribution was the major constraint; rainfall was received from October to November followed by a completely dry period from December to February. The entire crop dried out at flowering stage resulting in total crop failure. This made the households to have no food reserves. The maximum sorghum produced by HIV/AIDS affected households was 100kgs/farm. The sorghum was an alternative cereal to maize. Sweet potato was available from February to October. However, the quantities harvested were too low and two thirds of the households indicated no harvest from the past cropping season. The households skip some days without eating the sweet potato son that it covers a longer period. The early harvests resulted from lack of food reserves and sweet potato was indicated to be of high importance to the diet before other crops were harvested. No cassava was harvested in the past season.

Households caring for orphans also had no harvest for maize, however higher quantities of sweet potato harvested in comparison to households with chronically ill and those affected with death. This resulted from having higher quantities of planting material and labour availability especially for households with older orphans 14-17 years orphans. The consumption period for sweet potato ranged from April to September. Cassava is mainly consumed in July- August.

The HIV/AIDS affected households indicated coping strategies to lengthen the time the crops harvested could be utilised. The strategies included skipping meals, reduction of ration size and using sweet potato for breakfast and lunch where as maize constitute the evening meals.

In non-affected households one third indicated that the maize crop was badly affected by drought but the household was meeting its requirements from the grain stocks from the previous year's harvest. This category showed quite a large difference in food security status in comparison to HIV/AIDS affected households. The cereal reserves were used for hiring labour for cropping activities especially planting and weeding. These households started sweet potato consumption (May) later than households in the other categories. The households also had higher sales of sweet potato than other categories. The households indicated they were food secure because they had grain stocks which they expected would last up to the next season's harvest.

In contrast, 69% of the HIV/AIDS affected households did not have harvest maize and 31% would have all food stocks from harvest depleted by October 2010. That leaves a gap of 6 months before households could meet their food requirements from the next cropping seasons' harvest. In the same period households would need to be actively involved in agricultural activities.

Sweet potato was indicated to be quite an important part of the diet for HIV/AIDS affected households which harvest the crop in February. It assists households in the 6 month food gap were households have to access maize from other sources.

4.3.4 Households' responses to food insecurity

In response to food insecurity households find ways to meet household food requirements. The HIV/AIDS affected households indicated that food relief became a major source of maize considering that they had no savings and access to loans. The monthly rations received by the households were insufficient to cover a full month for the whole household. The households reduced ration sizes and skipped meals to lengthen the time for consumption of maize from food relief.

The data collected on the coping strategies employed by households to access maize did not show much difference among the AIDS affected households. However, the study revealed that the households with chronically ill persons did not use firewood sales as a strategy to access maize. This resulted from labour constraints because it needs people to travel (6-10km) on foot to fetch the firewood and also the same distance to Zvishavane town. The strategy is labour intensive and not ideal for households with chronically ill. Other intensive strategies include gold panning and casual work in farms. The households with chronically ill persons then dispose of farm implements and also distress sale of livestock. One household indicated distress sale of seed and fertiliser in order to access maize for consumption. However, sale of maize seed and fertiliser further undermines the household to produce food. Migration made households to seek for opportunities which would enable them to earn income to meet household food requirements. Though, migration would be to another area in Zimbabwe, crossing the border to South Africa was also indicated as an option. However, the strategy was risky as the migrants crossed the border without travelling documents which make them vulnerable.

Besides using farm produce to barter with maize, the study showed that households use destructive ways to access maize which limits their capacity to cope with future shocks. Households affected with death and those with orphans also showed similarities with households with chronically ill however, they indicated no sales of seed or fertiliser. Gold panning which is strategy among these two categories show a difference in the availability of labour in comparison with households with chronically ill. Sale of manure reduces soil fertility of the farm which further reduces crop potential. Table 5 shows the 'coping strategies' which farmers employed to access maize.

Table 5: 'Coping strategies' for accessing maize

Coping strategies	Category A	Category B	Category C	Category D
firewood sales	-	+	+	-
bartering with vegetables	+	+	+	-
bartering with firewood	-	+	-	-
casual work in exchange for maize	+	+	+	-
temporary migration	+	+	-	-
food relief	+	+	+	-
livestock sales	+	+	+	-
distress sale of seed and fertiliser	+	-	-	-
gold panning	-	+	+	-
sale of craft work	+	+	+	-
sale of manure	-	+	-	-
barter with sweet potatoes	-	-	+	-
Sale of farm implements	+	+	-	-

+ indicates the households use the strategy, - indicates the households do not use the strategy

4.4 Impact of cassava and sweet potato cultivation on livelihood assets

The production of cassava and sweet potato production was low to show much influence of the crop on strengthening the asset base of the households. Area under cultivation is quite low in comparison with other crops up to 10% of the total area under cultivation. In addition, the HIV/AIDS affected households indicated that the low production of cassava and sweet potato limited the contribution these crops to access agricultural inputs.

Membership to the Root and Tuber organisation was social capital which would organize the farmers and assist with the marketing of the crop. However, the interviewed households revealed the level of cassava and sweet potato production had made the crops only for subsistence and were not marketed through the established farmer organization.

The long wave impact of AIDS left households impoverished because of continued to depletion of household assets. The intervention alone could not stop the depletion of assets because cassava and sweet potato production were also affected by other factors like drought which limited the production as well as income of the crops. The impact of AIDS on households including labour and draft power also limited the extent to which farmers could produce cassava and sweet potato.

Lack of savings and inability to invest in agricultural inputs showed low level of income being experienced by HIV/AIDS affected households. It was also indicated sweet potatoes were grown mainly for subsistence except for a few cases where households sold to pay school fee or for barter with maize.

Education of children was shown to be supported by income from cassava and sweet potato. However these were primary school children; at secondary school level children were withdrawn from school. The project made farmers to have knowledge on a new crop (cassava) and skills for processing.

4.5 Perceptions on the role of cassava and sweet potato cultivation as AIDS impact mitigation strategy

The short maturing sweet potato varieties were appreciated by farmers as they mature in February when there is peak hunger. In addition, the households in all categories highlighted that they spent less time managing the sweet potato crop in comparison to maize, especially weeding. Weeding is done once in sweet potato compared to 2-3 times in maize. Households that had lost labour to illness and death expressed that it reduces peak labour demands because it is planted latter than other crops.

Sweet potato is mainly grown at the homestead and women could work in the fields along with other household chores after field activities. Sweet potato had several preparation methods which were preferred by chronically ill persons especially when mashed or consumed as fresh chips. It is also a strategy households can use to access maize through bartering or sale. The production of sweet potato avoids sale of assets to access maize which is quite important if households have to cope with future shocks.

Payment of school fees using cash from sweet potato was a priority for many households despite the low quantities they harvested. The households would prefer sending a child to school than to consume all the sweet potato. The farmers also appreciated the trainings that laid the foundation of the intervention because they acquired knowledge on the production of a new crop (cassava). In addition, the practical trainings on various preparation methods of sweet potato and cassava would break the monotony of maize dominated diet. However, with the decline in production of cassava and sweet potato it made the knowledge and skills acquired invisible.

4.6 Adjustments of the cassava and sweet potato intervention

Access to planting material depended on both the initial quantities that were distributed to farmers by Africare as well as the multiplication of the planting material by farmers at community level. The distributed planting material by Africare was lower than the targeted; in addition the established planting material was affected by drought which made lower quantities of planting material to be available to farmers. The availability of planting material would give the project a good starting point. However, the farmers' commitment to planting material multiplication at community level would give the project a better success.

Fear of poisoning from cyanogenic substances affected the production of cassava. The Midlands Root and Tuber association representative indicated it contributed significantly to the poor adoption of the crop in the area limiting the potential to contribute towards food security and income of households. The workshops that were conducted on production and practical trainings on processing and utilization of cassava laid a foundation to change the attitude of farmers towards the crop. However, a few farmers attended the trainings because the training sessions were done in another province. However, awareness of the crop and its processing on a larger scale would be useful for acceptance by farmers.

Cassava takes a longer time to maturity than sweet potato, therefore require farmers to fence their fields to protect the crop from both domestic and wild animals..

Chapter Five: Discussion

5.1 The smallholder farmers' vulnerability context

The smallholder farming system in Zimbabwe relies on the distribution of rainfall in cropping season for reasonable harvests among other factors. The dependence on rainfall makes the farming system vulnerable to the impact of AIDS. The activities like land preparation, planting and weeding should be timely done because the rainy period is short. HIV/AIDS related morbidity and mortality reduces the labour quality and quantity as house members may fail to do agricultural activities because of sickness or caring for the sick. In conditions of drought, as indicated in the past cropping season (2009/2010) the households affected by HIV/AIDS were more vulnerable. Toupozis and du Guerny 1999 stated that 'labour shortages exacerbated by HIV/AIDS combined with declining household incomes are compounding food insecurity and livelihood insecurity'. HIV/AIDS reduced the capacity of households to cope with drought because it affects firstly household labour which is important for all livelihood strategies a household can employ. This shows that farmers do not deal with only one external force at a time and but need to deal with several forces in their environment which make them more vulnerable.

5.2 Impact of AIDS of smallholder farmers' livelihood assets

The impact of AIDS on human capital is firstly felt through loss of labour. HIV/AIDS related illness results in decrease labour availability for crop production activities. Labour is lost through the illness of the household member and also through reallocation of labour to care for the sick. In households caring for orphans labour was also reallocated to care for the orphans especially 3-8 years. Death resulted permanent loss of the household member's labour and therefore decrease labour quantity. The study showed households affected by AIDS delayed in cropping activities because of labour constraints.

Human capital was affected by inability of households to educate children. The study showed households with chronically ill persons failing to pay school fees for their children and resorted to withdraw children from school. Girls were reported not to proceed to secondary school. Though the households responses emanates from the having insufficient income, withdrawal of girls from schools negatively impacts their future livelihood options. It also gives them a low socio-economic status which makes them susceptible to HIV infection because of few livelihood options.

Financial capital was also shown to be seriously affected by HIV/AIDS related morbidity and mortality. The households were also indicated to have no savings and access to loans. This condition reduced households' capacity to invest in agricultural inputs and as well led to livestock sales. Distress livestock sales impoverished the households and reduced the capacity for crop production because of lack of draft power. It is one of the reasons for late crop establishment as households need to exchange labour for land preparation.

Loss of physical assets for example ploughs, hoes, cultivators and ox-drawn carts further undermines household ability to recover from the shocks. AIDS is an external shock with a long wave impact on households, therefore the households' physical assets continue to decline as a result of illness or death.

The study revealed that households became reliant on firewood sales for exchange with maize or for cash. The concern over deforestation shows that the natural resource base has continued to decline and access to firewood might not be an option in the near future. The study also showed that women are travelling long distances into privately owned farms to fetch firewood. This makes them susceptible to abuse in order to be given permission to fetch firewood. There are chances that it may result in transactional sex making them susceptible to infection.

Fostering orphans was shown to increase household size as well as burden the elderly who would have lost children to the epidemic. The elderly are constrained in the capacity to educate the orphans as well as providing proper food. The study also revealed that women could not be allocated land when they are returned to their parents because of illness. The women would have reduced livelihood options; in addition the customary law also worsens their situation by not allocating them land. The rural economy is agricultural based in Zimbabwe and without land in the rural area it makes other options nearly impossible. This finding shows that women are disproportionately affected by AIDS (Mutangadura 2005).

5.3 Effect of cassava and sweet potato production

5.3.1 Area under cultivation and crops grown

The range of crops grown by both HIV/AIDS affected and non-affected households changed through addition of cassava and sweet potato. The households maintained all the other crops except for households with chronically ill which indicated that sorghum was labour intensive and had stopped growing the crop. The introduction of cassava and sweet potato was an opportunity for these households to diversify the crops grown and reduce the risk of no harvests. The introduction of sweet potato and cassava was indicated not to have changed the area under cultivation considering that the two crops occupy up to 10% of land under cultivation in each household category. Sweet potato was reported to be quite essential for households with chronically ill persons who had stopped growing sorghum because of labour constraints. The low influence of cassava and sweet potato resulted from the crop production constraints faced by small holder farmers. The constraints include lack of draft power, inputs, and labour, planting material and farm implements.

All household categories devoted much of their land to maize production, which also shows that the households prioritise maize for preference reasons. (Brown, Webb et al. 1994) indicated that 'households facing reduced incomes and labour availability may change cropping patterns and reduce purchased inputs such as fertilisers resulting in declining yields'. In the study households with chronically ill had reduced number of crops grown per farm but maize still remained the dominant crop. Cassava was scarcely grown and sweet potato had quite a low area under cultivation in comparison to other crops and maize. This contrast situations were cassava and sweet potato were increasing as households shifted from labour intensive crops.

AIDS has a long wave impact on the households which limited the potential of the intervention. A study conducted in Zimbabwe found that a decline in area under cultivation for AIDS affected households was as a result of shortage of labour, inputs, death of provider, lack of draft power and farm implements (Mutangadura and Sandkjaer 2009). In this study, data collected for the cropping season (2009/2010)

indicated the lowest area under cultivation for households that have experienced HIV/AIDS related illness or death. The lowest area under cultivation was for the households with chronically ill persons. In addition, they showed lowest crop diversity with labour intensive crops like sorghum no longer under cultivation. Though, the households stopped growing sorghum it is one of the cereal crops that are drought tolerant and reduces the risk of total crop failure. Loss of labour through chronic illness as well as reallocation to care for the sick affected labour availability. In addition other factors also affected the area under cultivation which included lack of draft power and insufficient inputs.

Shortage of draft power was cited by several households as limiting the area under cultivation. There was an indication that some households also exchange their labour for land preparation. They work in farms of those households with draft power so that their land could be prepared. This also causes delays in the establishment of crops for these households limiting the capacity of the households to have a higher area under cultivation. HIV/AIDS related mortality and morbidity has contributed to loss of livestock for most households through distress sale to meet food requirements and medical costs. A study conducted in Muzarabani district, Zimbabwe revealed that the main motives for livestock sales were to meet increasing food and medical costs and funeral expenses (Mutenje, Mapiye et al. 2008). However, this further weakens the asset base of the households limiting their capacity to recover from future shocks. Households also had distress sale of seed and fertiliser obtained from the government schemes when confronted with increased medical costs. The loss of seed and fertiliser meant that the households would not be ready for the next cropping season and it caused late establishment of crops in their fields.

The HIV/AIDS affected households had lower area under cultivation compared to non-affected households. Loevinsohn (2008) stated that 'Households often reduce the area they cultivate and farm it less intensively, leading to a fall in production'. The study also showed low use of fertiliser and manure which results in continued decline in soil fertility undermining food production. Household composition indicated that it is important for productive persons available for agricultural activities. Though farmers could aim for higher crop production in a season, lack of food reserves make the households find ways for obtaining maize. The coping strategy of hiring out their labour in exchange of maize also contributes to the low area under cultivation. This sets a bad start to the cropping season for these households, as this strategy makes better farmers to be always ahead in terms of farm operations. The households had to allocate labour for caring for the sick, for casual labour and its own farm production. As revealed in this study, at such times they might not have anyone to work in their own farms limiting their potential for a better harvest. This reflects a cycle of food insecurity for HIV/AIDS affected households which is difficult to break. When the households plant later in the season the midseason dry spells affect crop establishment and ultimate yield. The households with female adults who were chronically ill had the lowest area under cultivation. This showed the importance of women for most labour intensive tasks undertaken during crop production. Wieggers, Curry, Garbero and Hourihan (2006) indicated that 'smallholder agriculture is vulnerable to decline in productive capacity because it is labour demanding and relies mostly on family labour especially that of women'.

The study revealed that the farmers who grew sorghum, in the past cropping season it became the dominant cereal consumed after harvesting because maize crop had

failed. Crop diversification for HIV/AIDS affected households is important because of unreliable rainfall.

Labour sharing agreements were done by households caring for chronically ill persons or caring for orphans. This enabled the households to plant a bigger area than the capacity they had as individual households. The distress sale of livestock led to lack of draft power and the households with draft power teamed up to assist each other in order to plant a bigger area. Social capital in this instance became vital to the households especially for planting maize.

5.3.2 Impact of cassava and sweet potato cultivation on household labour

It was shocking to realise that cassava was hardly being grown by farmers in the wards which were targeted by the Midlands Food Security and HIV project. This was a setback to the study as it limited what could be learnt in terms of labour allocation among crops grown by the households. Households involved in the study relied mostly on family labour for agricultural activities including land preparation, planting, weeding, harvesting and crop processing. Nweke et al (2004) indicated that cassava is one of the easiest crops that can be grown by HIV/AIDS affected households. The households in the study rated the labour required for cassava and sweet potato against the number of times for weeding. In comparison with maize the households confirmed that the production of cassava and sweet potato require less labour because weeding is done once. However, some households indicated sweet potato production is labour intensive at land preparation and planting and the tasks were mostly done by women.

Women were indicated to do most of the tasks in sweet potato production including weeding and harvesting. Though men could be involved in the cultivation of sweet potato the study showed that women have the burden of sweet potato production. It increases their workload as they equally work for the production of other crops and also had the care giving role which is further increased when the household had chronically ill person(s). This could depict the perception of sweet potato as 'women's crop'. If the crop was grown on a larger scale its impact on household labour allocation would be much visible but in this study the small area under cultivation was limiting.

5.3.3 The contribution of cassava and sweet potato to household food security

Maize is the dominant food crop and households classify themselves food insecure/ food secure using their maize grain reserves. According to the FAO 1996 'food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'. HIV/AIDS has impact on the three dimensions of food security: food availability, access and utilization which are recognizable in the FAO definition. The study showed that only the non-affected households having grain stocks which they expected to be available until the next harvest.

As reflected on the area under cultivation AIDS undermines the capacity of households to produce food. Own production for smallholder farmers should account the greater percentage of the food available to the household because they depend

on agriculture for their livelihood. The study revealed that households' food production constitutes the smallest percentage of food that is consumed by the household. This was reflected with no harvests for maize where farmers have to access maize from other sources for a full year. The potential of cassava and sweet potato were to fill in the gaps of maize as the staple crop. The quantities of cassava and sweet potato produced by farmers as revealed in this study were minimal to show significant changes to food availability and access of households especially with no harvests for maize. Sweet potato is used by some households to barter with maize but the low production limits the contribution it makes to food security of the household. The use of sweet potato for bartering with maize indicates that sweet potato is not replacing maize but it is a strategy farmers can use to access maize. The early maturing varieties of sweet potato which mature in February when planted in November/December fill in the gap during the first few months of the year before harvesting maize. It is also used to cover meals during the day and maize will constitute the major part of the diet in the evening. This is actually a coping strategy by households to lengthen the time for consumption of maize.

Food security status of the households reflected that households are obtaining maize from other sources than from their farm production. Households with chronically ill persons rely on food relief for their maize supplies. The food relief programmes deal with the current food insecurity but do not prepare the households to deal with future shocks. However, it is an important programme to prevent asset loss by households due to food insecurity. The cassava and sweet potato intervention was an important collaborative effort for the smallholder farmers to diversify crop production and improve their food security by accessing maize using income from the two crops.

Pinstrup-Andersen highlighted that income does not fully entail household food security because a household may prioritise acquisition of other things over acquisition of food. This has been revealed in this study where some households prioritise education of children and split up the harvest even when the quantities are low. Another scenario was when a husband marries another wife after he had gone for gold panning. Also because of HIV/AIDS related illness households which are food insecure have to allocate money both for food and medical expenses. This shows that total production of crops, though total crop production is important it is more essential to understand how the crop was used. The household may be rendered food secure from total harvest but yet food insecure because other demands that were prioritised over food.

5.3.4 Household's coping strategies for dealing with food insecurity

The several coping strategies employed by the different household categories as shown in Table 6 have impact on the household. Although households try to avert the impact of AIDS, some of their responses are destructive e.g. sale of farm implements, livestock, distress sale of seed and fertilisers. The loss of bigger productive assets shows severity of their food insecurity.

Migration for casual work in South Africa without travelling documents shows that HIV/AIDS affected households are not passive recipients but are active taking risks in order to change their situation. However, they might end up in situations which make them susceptible to HIV infection.

Sale of firewood or bartering with maize was reported to be a common strategy especially with electricity problems being encountered throughout the country. The forests are increasingly becoming depleted and people are travelling long distances to fetch firewood from nearby farms. The firewood is obtained illegally which makes women susceptible to abuse in order to get the firewood. In addition, the absenteeism of children from schools assisting with sale of firewood in order to pay school fees. This shows desperation of orphan care givers and as well trying to cope with demands of education. Sale of firewood though it might be assisting at the moment it looks short lived as the deforestation is intensifying bringing environmental concerns.

The HIV/AIDS affected households' sale manure to better off farmers who keep up soil fertility of their fields but the crop production capacity of affected households continue to decline. It was also noted that for food insecurity reasons households' sale maize seed and fertiliser. This gives them a bad start in the cropping season and always limit their potential to be food secure from own production.

5.4 Impact of cassava and sweet potato production on livelihood assets

The production of cassava and sweet potato production was low to show the influence of the crop on strengthening the asset base of the households. The households interviewed in the study indicated that sweet potato and cassava have been grown mainly for subsistence. Therefore, the crops did not contribute to build up savings or incomes of the households. The strategies employed by households are continued to deplete household assets. Most HIV/AIDS affected households had no livestock at the time of the study and were failing to restock. Cassava and sweet potato would have contributed towards preserving/strengthening the household asset base. However, the households continued to lose their assets after the two crops were introduced. The intervention alone could not improve the peoples' livelihoods because of the severity of the impact of AIDS as well as other external forces like drought which limited the crops potential yields.

5.5 Adjustments to cassava and sweet potato cultivation

Cassava production is hindered by the fear of cyanide poisoning which affects farmers' preference for the crop. Awareness of the crop would need people to knowledgeable about the crop. Instead of having training sessions in a distant province, the farmers suggested that it would be convenient for those caring for chronically ill and orphans to attend the trainings in their respective wards.

To replenish the planting material for cassava farmers indicated that the need for Africare to support with the initial planting material for cassava. The farmers would take responsibility of multiplication of planting material and distribution.

Cassava takes a longer time to mature and the need for fencing also mean that farmers incur costs in establishing cassava. This is a major challenge for HIV/AIDS affected households who have no savings and have already lost assets. Therefore the households find it difficult to experiment with cassava when they have immediate needs for money especially medical costs and household food needs.

Chapter Six: Conclusions and recommendations

6.1 Conclusions

Drought has been a major threat to crop production in Zvishavane district; the maize crop is mostly affected. Although cassava and sweet potato crops are drought tolerant, extensive dry period lowered the yields of the crops. Cassava cuttings dried out in this condition and limited the multiplication of the planting material. HIV/AIDS further worsened the farmers' situation by eroding assets making the farmers more vulnerable. In addition, it has limited the capacity farmers to recover as most households indicated that the disposed assets like cattle and farm implements could not be replaced. Promoting cassava and sweet potato alone could not improve the food security and income of households because the farmers were confronted with many challenges that were limiting the production of other crops.

Maize has remained the dominant food crop grown by both HIV/AIDS affected and non-affected households. Households judge their food security status depending on the maize (staple crop) harvest. Therefore, at the beginning of the rainy season farmers concentrate on planting maize before other crops. Insufficient amount of maize from farm production make the households food insecure. This causes the households to find strategies to meet the deficit. The strategies vary within the households and have impact on the household's livelihood assets. The sale of farm implements and livestock as a strategy to access maize undermines the household capacity to produce food. Sale of seed and fertiliser make the households less prepared for the cropping season. This showed that farmers respond to the immediate needs but such responses are destructive making the households more vulnerable to the impact of AIDS. The households with chronically ill tended to avoid labour intensive strategies like gold panning and firewood sales. Selling of firewood as a strategy was found to be short lived and unsustainable because of environmental concerns.

The HIV/AIDS affected households were found to be food insecure. Food availability for HIV/AIDS affected households showed that for the households that harvested maize there was a gap of six months between the time the households exhausted the harvested maize to the next expected crop harvest. On the other hand, the HIV/AIDS affected households that did not harvest maize experienced a complete year of food unavailability as they had no maize reserves from the past season. The households have become dependent on the food relief programme. The strategies employed by households to ensure food security are skipping meals and reduction of ration size to lengthen the time for consumption of food accessed from relief programme or from their harvest. Some of the strategies include skipping meals, reduction of ration size and using maize for evening meals only.

The lowest area under cultivation was associated with households caring for chronically ill females. This showed much importance of female labour in smallholder agriculture. Labour loss in HIV/AIDS affected households made labour sharing arrangements an important strategy for households with chronically ill to plant maize. Working in teams made the households to have a larger area under cultivation than what a household would achieve on its own. The factors that contributed to the low area under cultivation included lack of draft power, insufficient inputs and labour.

Cassava and sweet potato crops were added on to the range of crops grown by farmers. Cassava and sweet potato have not been grown to the extent of marketing as an association. The production levels are low and the crops are mainly for subsistence. There was no trend of increased production of cassava and sweet potato instead the area under cultivation of these crops has been declining over the years. Cassava is scarcely grown by farmers and greatly limited in its contribution to food security. Household food security did not show improvement with cassava and sweet potato production except when sweet potato is harvested in February before other crops could be harvested. Sweet potato was used as a coping strategy by households either to lengthen the time for consumption of maize or through barter to access maize. The harvested quantities 10-60kgs/farm would not suffice to improve the food security of households affected with death and households affected with chronically ill.

Sweet potato production had most of the tasks done by women; planting, weeding and harvesting. However, sweet potato requires less labour in comparison to maize especially for weeding task mostly done by women. In households where women were chronically ill, area under sweet potato would be low or a household would fail to plant the crop.

The greatest fear regarding cassava production is cyanide poisoning which contributed to the low production of the crop. It affected farmers' preference for the crop despite the training on processing and utilization. Though, it is labour extensive farmers still commit themselves to grow maize. The long time to maturity for cassava made it different from the annual crops which farmers are familiar with. The farmers were food insecure and would not wait for 15-18 months to harvest the crop. Planting material was indicated as the major limitation to the production of both cassava and sweet potato. However, from the results of this study there is bias towards production of sweet potato. It was shown by preservation of sweet potato planting material.

Payment of school fees is the major challenge for households caring for orphans and other HIV/AIDS affected households. Girls were withdrawn from school and did not proceed to secondary education. This limits their future livelihood options and gives them a low socio-economic status which makes them susceptible to HIV infection.

The study showed that women are disproportionately affected by AIDS because they are sent back to their parents when chronically ill. Customarily women are not allocated land, therefore limiting access to land which would be an important part of their livelihood.

The desperate need to meet household food requirements and need for income household members migrates to South Africa for casual work even without legal travel documents. The illegal crossing of the border to South Africa makes them susceptible to HIV infection especially for women.

The production of sweet potato and cassava did not preserve the assets of HIV/AIDS affected households, instead their assets base continued to decline. The households have remained vulnerable to the impact AIDS. In addition, the current state of food insecurity show that the farmers may further lose assets because HIV/AIDS is also worsening the situation by contributing to asset loss.

6.2 Recommendations

The recommendations presented for consideration by Africare are based on the need to preserve assets, to reinforce and build upon existing patterns of coping, and to implement interventions before divestment of productive assets begin.

In all household categories farmers grew sweet potato which show that farmers have preserved the planting material though it is insufficient for planting larger areas. Africare would need to concentrate on the sweet potato crop which farmers are familiar with and have shown preference. This would be done through restocking of planting material and re-establishing sweet potato multiplication sites. It expands area under cultivation as well as strengthens the strategy used by farmers of bartering sweet potatoes with maize. The strategy would avoid sale of assets for food security reasons. The farmers would need to be organised at community level for multiplication of planting material and distribution. Cognisance of gender roles regarding sweet potato production and flexibility of the roles with the expansion of the area under cultivation would be important. The increased production would be a way to strengthen the functioning of the root and tuber association. Marketing through this farmers' organisation give farmers the bargaining power in contrast to where they sale the crop out of distress. Africare will incur the costs for restarting the project and replenish the planting material.

The six months gap identified where all HIV/AIDS affected households would have exhausted all the maize is a point for intervention. Africare should target the six months gap for an intervention. Currently, sweet potato and cassava are available in the same period households would have some harvest of maize, thus these crops are covering one period. This also shows that it is the time farmers would sale their assets to access maize. Targeting the intervention at this point would avoid sale of assets. In addition, it is the same time farmers have peak agricultural activities. Without maize, households at this time look for opportunities for casual work in exchange for maize, which brings them back to the cycle of no harvest because they lag behind in field operations.

There is need for Africare to consider improving vegetable production and value addition (preservation). From the study, farmers were found to be using vegetables in exchange with maize. Improved vegetable production would have double fold benefits to the households by enhancing both their nutrition and for accessing maize.

Households with chronically ill persons, incurred high medical costs this limited investment in education. Girls were reported to be withdrawn from school and not attaining secondary education. Africare need to collaborate with organisations working on orphans and vulnerable children which would give children from the HIV/AIDS affected households the right to education. This is also important for their future livelihood options; if the children are educated it also raises their socio-economic status giving them better opportunities other than transactional sex.

There is need for Africare to initiate Lending and Savings Club for HIV/AIDS affected households to support access to loans. The clubs can be adapted to allow flexibility of repayment of loans to accommodate the sudden demands for expenses in HIV/AIDS affected households. This also serves as a safety net for the households. Instead of disposing productive assets the farmers can have loans from the Lending

and Savings Club were they are members. This would reduce high charges of interest that the farmers would face if lending is done by institution.

There is need for Africare to create project ownership through participation of target beneficiaries in needs assessment and prioritisation of the needs. This would make the organisation to address the specific needs of the beneficiaries and also sustainability of the project. From the results, sweet potatoes were preferred to cassava by the farmers.

Reference

Africare, 2007. Improving food security, nutrition and economic status for people living with and affected by HIV/AIDS in Shurugwi and Zvishavane districts- Midlands Province. Project Completion Report, Africare Zimbabwe

Babaleye, T. 1996. Cassava, Africa's Food Security crop. Consultative Group on Agricultural Research (CGIAR), Vol. 3, Number 1

Barnett, T. And Grellier, R., 2003. Mitigation of the impact of HIV/AIDS on rural livelihoods through low-labour input agriculture and related activities. The Overseas Development Group (ODG), Norwich. Available at: http://www.research4development.info/PDF/Outputs/HIV_AIDS/FINFINAL_MITIGATION_OF_THE_IMPACT_OF_HIV.pdf Accessed 17 June 2010

Bonnard, P. 2002. HIV/AIDS mitigation: Using what we already know. Food and Nutritional Technical Assistance (FANTA), Technical Note.5.

http://www.fantaproject.org/downloads/pdfs/tn5_hiv.pdf Accessed 06 Jul. 10

Brown, L. R., Webb, P. and Haddad, L. 1994. "The role of labour in household food security: implications of AIDS in Africa." *Food Policy* **19**(6): 568-573

Bouis, H and Hunt, J. 1999. Linking Food and Nutrition Security: past lessons and future opportunities. *Asian Development Review*. Vol.17, No.1,2, pp168-213

CSO, 2007. Zimbabwe Demographic and Health Survey 2005-06, Central Statistical Office, Zimbabwe. Available at: <http://www.measuredhs.com/pubs/pdf/FR186/FR186.pdf> Accessed on 28 June 2010.

De Waal, A. & J. Tumushabe, 2003. AIDS and Food Security in Africa. Report for Department for International Development (DFID), London

De Waal, A and Whiteside, A. 2003. New Variant famine: AIDS and food crisis in Southern Africa, *The Lancet*, Vol. 362. Available at: http://www.ifas.org.za/aporde/docs/20-De-Waal-Whiteside_Aids-and-food.pdf Accessed on 29 June 2010

Drinkwater, M. 2003 .HIV/AIDS and Agrarian Change in Southern Africa: Presentation for the United Nations Regional Inter-Agency Coordination and Support Office Technical Consultation on Vulnerability in the light of an HIV/AIDS Pandemic,9-11 September 2003, Johannesburg, South Africa

Dixon, J., Gulliver, A and Gibbon, D. 2001. Farming systems and poverty: Improving farmers' livelihoods in a changing world. FAO and World Bank, Rome, Italy

ECA, 2006. Mitigating the impact of HIV/AIDS on smallholder agriculture, food security and rural livelihoods in Southern Africa: *Challenges and action plan*

<http://www.uneca.org/srdc/sa/publications/HIV-AIDSandAgriculture.pdf> Accessed 02 July 2010

Ellis, F. 1999. Rural livelihood diversity in developing countries: evidence and policy implications. Overseas Development Institute, Number 40. April 1999. <http://www.odi.org.uk/resources/download/2112.pdf>

Ellis, F. 2000. Rural Livelihoods and Diversity in Developing countries. Oxford, UK

Food and Agriculture Organization of the United Nations (FAO). 1996. World Food Summit Plan of Action (Rome: FAO). http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/W3613E/W3613E00.HTM

FAO. 1999. Conducting PRA training and Modifying PRA tools to your needs. An example from Participatory Household Food Security and Nutrition Project in Ethiopia. Rome: FAO

FAO, 2003. Measuring impacts of HIV/AIDS on rural livelihoods and food security. Sustainable Development Department. Available http://www.fao.org/sd/2003/PE0102a_en.htm

FAO, 2006. Fertiliser use by crop in Zimbabwe. Agriculture and Consumer Protection. FAO Available at: <http://www.fao.org/docrep/009/a0395e/a0395e06.htm#TopOfPage> Accessed on 28 June 2010.

FAO. (no date) Strengthening Institutional Capacity in mitigating HIV/AIDS impact on the Agriculture Sector; *Potential Mitigation interventions* Available at: <ftp://ftp.fao.org/docrep/fao/007/y5656e/y5656e00.pdf>

Gillespie, S and Kadiyala, S. 2005. HIV/AIDS and Food and Nutrition Security: From Evidence to Action. International Food Policy Research Institute (IFPRI). Food Policy Review 7.

Hillocks, R.J., Tresh, J. M and A, Bellotti. 2002. Cassava in Africa: In Cassava: Biology, Production and Utilization, CABI, UK. Available at: http://webapp.ciat.cgiar.org/downloads/pdf/cabi_06ch3.pdf

Hunter, S. S., Bulirwa, E. and Kisseka, E. 1993. "AIDS and agricultural production: Report of a land utilization survey, Masaka and Rakai Districts of Uganda." Land Use Policy **10**(3): 241-258.

Jayne, T. S., Villarreal, M., Pingali, P. and Hemrich, G., 2005. HIV/AIDS and the Agricultural Sector: Implications for Policy in Eastern and Southern Africa. e JADE. Vol. 2, No. 2, 2005, pp. 158-181. Available at: <ftp://ftp.fao.org/es/esa/ejade/jayne.pdf> Accessed 18 June 2010

Kamukondiwa, W. 1996. Alternative food crop to adapt to potential climatic change in southern Africa. Scientific and Industrial Research and Development Centre, Environment and Remote Sensing Institute, Harare

Available at: <http://www.int-res.com/articles/cr/6/c006p153.pdf>

Kleigh, U. 1995. Potential of cassava in Zimbabwe: a case study for the Southern African region. Natural Resources Institute, Chatham Maritime, Kent (United Kingdom). Accessed 31 August 2010. Available at: http://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_6/colloques1/43511.pdf

Loebenstein, G and Thottapilly, G. 2009. The sweet potato. Springer

Loevinsohn, M. and Gillespie, S., 2003. HIV/AIDS and Food Crises in Southern Africa: an agenda for action research and for learning how to respond. FAO International Workshop on "Food Security in Complex Emergencies: building policy frameworks to address longer-term programming challenges" Tivoli, 23-25 September 2003. Available at: <ftp://ftp.fao.org/docrep/fao/meeting/009/ae510e.pdf>
[Accessed 18 June 2010](#)

Loevinsohn, M. 2008. Innovation in Agriculture and NRM in communities confronting HIV/AIDS: a review of international experience. *Prolinnova Working Paper 18*. Wageningen, Netherlands

Mano, R and Matshe, I. 2006. Impact of HIV & AIDS on agriculture and food security from Zimbabwe: Empirical Analysis of Two Districts in Zimbabwe, FANRPAN, University of Zimbabwe

Manzungu, E. (no date). What happens to sweet potatoes? Farmers' strategies threatened. Department of Soil Science. University of Zimbabwe

Masanjala, W., 2007. The poverty-HIV/AIDS nexus in Africa: A livelihood approach. *Social Science and Medicine* 64 (2007) 1032-1041

Mather, D., Donovan, C., Jayne T.S and Weber, M. 2005 Using Empirical Information in the Era of HIV/AIDS to Inform Mitigation and Rural Development Strategies: Selected Results from African Country Studies. *American Journal of Agricultural Economics*, 87(5).1289-1297

<http://ajae.oxfordjournals.org/content/87/5/1289.full.pdf+html>

Maxwell, D. G. 1996. "Measuring food insecurity: the frequency and severity of 'coping strategies'". *Food Policy*, Vol.21, No.3, pp291-203

Mutangadura, G.B., 2005. Gender, HIV/AIDS and rural livelihoods in Southern Africa: addressing the challenges. *JENDA: A Journal of Culture and African Women Studies*. Issue 7 (2005). Available at: <http://www.jendajournal.com/issue7/mutangadura.html> Accessed 14 February 2010

Mutangadura, G. B. and B. Sandkjaer (2009). "Mitigating the impact of HIV and AIDS on rural livelihoods in Southern Africa." Development in Practice **19**(2): 214-226.

Mutangadura, G. Mukurazita, D. and Jackson, H., 1999. A review of household and community responses to the HIV/AIDS epidemic in the rural areas of sub-Saharan Africa. UNAIDS. Geneva. Switzerland. Available at: http://data.unaids.org/Publications/IRC-pub04/una99-39_en.pdf Accessed 17 June 2010

Mutandwa, E. 2008. Performance of Tissue Cultured sweet potato among smallholder farmers in Zimbabwe. *AgBioForum*, 11(1):48-57 Available at: <http://www.agbioforum.org/v11n1/v11n1a05-mutandwa.pdf>

Mutisi, C. 2009. Situation analysis of agricultural research and training and support strategies for the national agricultural research system in Zimbabwe. Implementation and Coordination of Agricultural Research and Training (ICART) in the SADC region. Phase 3 Report . Available at: <http://www.sadc.int/fanr/agricresearch/icart/inforesources/situationanalysis/ZimbabweSitAnalysisFinalReport.pdf> Accessed 2 July 2010

Mutenje, M. J., Mapiye, C., Mavunganidze, Z., Mwale, M., Muringai, V., Katsinde, C and Gavumende, I. 2008. "Livestock as a buffer against HIV and AIDS income shocks in the rural households of Zimbabwe." Development Southern Africa **25**(1): 75 - 82.

Nweke, F., Haggblade, S and Zulu, B. 2004. Building on successes in African agriculture: Recent growth in African Cassava. *Focus 12*, Brief 3 of 10. 2020 Vision for Food, Agriculture and the Environment

Pinstrup-Andersen, P. 2009. Food security: definition and measurement. *Food Sec*, (2009)1:5-7 Available at: <http://www.springerlink.com/content/1078m65444024k98/fulltext.pdf>

Topouzis, D. 1999. The Implications of HIV/AIDS for Household Food Security in Africa. UNECA. Food Security and Sustainable Development Division. Available at: http://www.uneca.org/popia/gateways/Women_Back_doc_4.pdf Accessed 17 June 2010

Topouzis, D. 2003. Addressing the impact of AIDS on ministries of Agriculture: focus on East and Southern Africa. FAO/UNAIDS, Rome. Available at: <http://www.fao.org/hivaids/publications/moa.pdf> Accessed on 17 June 2010

Smith, M. 2004 "Born-again crops give hope to Zimbabwean farmers: Ian Robertson and his colleagues have found a way to free staple crops from viruses, with dramatic results for their growers". For A Change. FindArticles.com. 31 Aug, 2010. http://findarticles.com/p/articles/mi_m0KZH/is_6_17/ai_n8694091/

UNAIDS. 2008. Epidemiological Fact Sheet on HIV and AIDS, Zimbabwe: Core data on epidemiology and response. UNAIDS/WHO. Geneva. http://www.unaidsrstes.org/files/zimbabwe_report.pdf

Wiegiers, E.S., 2004. AIDS, Gender Inequality and the Agricultural Sector: Guidelines for Incorporating AIDS and Gender Considerations into Agricultural Programming in High Incidence Countries. Report for Canadian International Development Agency (CIDA). Interagency Coalition on Aids and Development (ICAD), Ottawa

Wiegiers, E., Curry, J., Garbero, A and Hourihan, J. 2006. "Patterns of Vulnerability to AIDS Impacts in Zambian Households." Development and Change **37**(5): 1073-1092.

Wiegiers, E.S. 2008. The role of the agricultural sector in mitigating the impact of HIV/AIDS in Sub-Saharan Africa. Wageningen University. NJAS Vol. 56, No 3 (2008)

Annex A

Checklist for smallholder farmer interviews

Impact of AIDS on livelihood assets

Financial

- Savings
- Loans
- Livestock
- Income and expenditure patterns

Social

- Social networks and membership in community groups

Natural

- Access to land
- Area under cultivation and crops grown
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Human

- Labour
- Education

Physical

- Farm implements
- Draft power
- Buildings

Livelihood strategies

- Agriculture
- Non-farm activities
- Migration

Food production and food security

- Area under cultivation
- Crops grown
- Labour
- Food availability

Income sources and coping strategies for accessing maize

Perception on the role of cassava and sweet potato intervention

Adjustments to the cassava and sweet potato project

Impact of cassava and sweet potato on livelihood assets

Checklist for key informant interviews

Impact of AIDS related illness and death or orphan care giving on crop production

Effect of cassava and sweet potato on food security and income

Perception on role of cassava and sweet potato in AIDS impact mitigation

Adjustments to the cassava and sweet potato project