

## **Increasing Food security of HIV/AIDS affected household through intercropping in west district, Zanzibar.**

A Research project submitted to Van Hall Larenstein University of Applied Sciences in Partial Fulfillment of the Requirements for the Award of Masters Degree in Management of Development with Specialization in Rural Development and HIV/AIDS

October, 2009  
By Abdalla Ibrahim Ali  
Van Hall Larenstein University of Applied Sciences 2009

Van Hall Larenstein Part of Wageningen UR  
The Netherlands  
© Copyright Abdalla I Ali, 2009. All rights reserved

## **Permission to use**

In presenting this research project in partial fulfillment of the requirements for Master Degree, I agree that the Library of this University may make it freely available for inspection. I further agree that permission for copying of this research project in any manner, in whole or in part, for scholarship purposes may be granted by Larenstein Director of Research. It is understood that any copying or publication or use of this research project or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University in any scholarly use which may be made of any material in my research project.

Requests for permission to copy or to make other use of material in this research project in whole or part should be addressed to:

Director of Research  
Larenstein University of Applied Sciences  
P.o. Box 9001  
6880 GB Velp  
The Netherlands  
Fax: 31 26 3615287

## **Dedication**

### **To my family**

This thesis is dedicated to member of my family: Wife Halima, Late Mum Farisha, Dad Ibrahim, My daughters, Aisha, Ilham, Zainab and Faika, Bothers, Mohd, Amin, Thabit and Ramadhani, my Sisters Amina, Zainab and Khadija, my cousins, Grand farther, and my friend Dr Haji Mwevura and Ali Maulid Juma.

## **Acknowledgement**

I salute the Almighty Allah (God) for His mercies, intellectual, spiritual, mental and physical providence during my one years of academic at Van Hall Larenstein University, The Netherlands.

I would like to take this opportunity to express my sincere appreciation to all organizations and people who contributed to the work embodied in thesis. In the first place, I would like to mention Nuffic scholarship program Committee and The Staff members of Van Hall Larenstein University for financially sponsoring my study. I would like to express my profound gratitude to my supervisor Mrs., Kingma , Koos of Van Hall Larenstein for her immense contribution and advice towards the completion of my thesis. My learning increased immensely and I gained much confidence during my interactions with Koos. Special thanks to Head of Plant Protection Division for her constant academic and logistic advice throughout the study period. Her contribution made my dream of becoming Professional in Rural development and HIV/AIDS analyst a reality.

I am very much indebted to Mrs Asha Abdulla and the entire technical team of ZAC, Zanzibar and Plant protection division staffs for their assistance and encouragement to me during study period. Their contribution and positive critiques provided a shining shape of the presented thesis.

I would like to thank the following that worked with me in this study, Dr Haji Mwevura, Mr, Abdul Juma, Mr, Djalal from Benin, Mr Juma Wickama, Mr Hassan Faki, Mr Dude, Mr Kimwaga and Petan, My heartfelt gratitude's to Mrs. Halima Ali Hassan and Mrs. Jamila Abbas Seif for their moral and family support during my study period. I would like to appreciate the moral and physical support of my colleagues RDA/MOD students start with Susan, Tabi, Sergio, Baraka, Fedes, Linda, Rose, Bethelhem, Suubi, Jenifer and Wondimu. Thank also should go to farmers for their excellent cooperation in this work, without them this work will ever finish.

## Table of Contents

Permission to use .....	ii
Dedication .....	iii
Acknowledgement .....	iv
Table of Contents .....	v
List of Tables .....	vii
List of figures .....	viii
List of Abbreviation .....	ix
Abstract.....	x
<b>Chapter1.: Introduction .....</b>	<b>1</b>
1.1. HIV and AIDS in Zanzibar .....	1
1.2. HIV impact mitigation activities in Zanzibar.....	2
1.2.1. The AIDS and food production in Zanzibar .....	3
1.3. Zanzibar’s food security situation.....	3
1.4. Zanzibar intercropping and cropping seasons system.....	4
1.5. Percentage of population below the food poverty line in different.....	4
districts of Unguja Island .....	4
1.6. Goal, mission and vision of my organization .....	5
1.7. My position in organisation .....	5
1.8. Problem statement.....	6
1.9. Research Objective: .....	6
1.10. Main research question: .....	6
1.11. Sub-questions. ....	6
<b>Chapter2.: Conceptual framework and Literature Review.....</b>	<b>7</b>
2.1 Impact of AIDS on labour in food production.....	7
2.2. Impact mitigation on AIDS household labour .....	8
2.3. Relations between HIV AIDS and food security.....	9
2.4. Conceptual framework.....	10
2.5. Definition of concept .....	11
2.6. Importance of Intercropping to AIDS affected rural household.....	12
<b>Chapter 3. Methodology .....</b>	<b>14</b>
3.1. Target group.....	14
3.1.1. Study area.....	14
3.1.2. Sites selection criteria .....	14
3.1.3. Data analysis .....	14
3.1.4. Study design.....	15
3.1.5. Data Collection .....	15
3.1.6. Selection of respondents .....	15
3.1.7. Ethical Consideration.....	15
3.2. Study limitations .....	16
<b>Chapter 4 Findings.....</b>	<b>17</b>
4.1. Demographic composition of household surveyed.....	17
4.2 Impact of AIDS through illness and death.....	18
4.2.1. Long illness .....	18
4.2.2. Household death in the last five years.....	19
4.3. Impact on labour .....	19

4.4 Impact on crop production .....	20
4.5. Land ownership for crop production in HIV/AIDS affected household in west district.....	21
4.6. Household source of information on crop intercropping in west district of Zanzibar.....	22
4.7. Yearly food shortage.....	23
4.8. Farmers´ opinion on use of intercropping to mitigate food insecurity.....	24
4.9. Reasons of use intercrop on HIV/AIDS affected household .....	25
4.10. The intercropping system for mitigating food insecurity to HIV/AIDS affected household in west district of Zanzibar .....	26
4.11. Factors contributing to poor crop intercropping on HIV/AIDS affected household in west district Zanzibar.....	26
<b>Chapter 5. Discussion .....</b>	<b>30</b>
5.1. Demographic composition .....	30
5.2. Long illness and death .....	30
5.3. Household Labour.....	30
5.4. Crop Production .....	31
5.5. Factors contributing to low crop production.....	31
5.6. Land ownership.....	32
5.7. Agriculture information .....	32
5.8. Production seasons .....	33
5.9. Importance of intercropping on mitigating labour and food security. ....	33
5.10. Type of intercrops .....	33
<b>Chapter 6. Conclusion and Recommendation.....</b>	<b>35</b>
6.1. Conclusion .....	35
6.2. Recommendations .....	36
<b>References .....</b>	<b>37</b>
<b>Annex.....</b>	<b>40</b>

## List of Tables

Table 4. 1: Demographic profile of household	18
Table 4. 2: Household members suffered from long illness west district Unguja	19
Table 4. 3: Death in the household in the last five years by bender in west district Unguja	19
Table 4.4: Household labour sources for crop production	20
Table 4. 5: Household information sources on crop intercropping west district	23
Table 4. 6: Household opinion on intercropping mitigated food insecurity.	25
Table 4. 8: Household best intercropping mitigating HIV/AIDS	26
Table 4. 9: Factors contributing to poor crop intercropping to HIV/AIDS affected household in west district	27

## List of figures

Figure 1. 1: Percentage population below food poverty line	5
Figure 2. 1: Conceptual framework: AIDS and agriculture in a household	11
Figure 4. 2: Land ownership in household affected with HIV/AIDS by gender in the west district Unguja.	22
Figure 4. 3: Food shortage during the year in the west district by gender Unguja.	24
Figure 4. 4: Row intercropping farming system in west district Unguja	29

## List of Abbreviation

AIDS	Acquired Immunodeficiency Syndrome
ART	Anti-retroviral Therapy
ASP	Agricultural Sectoral Policy
CHBC	Community Home Based Care
CMO	Chief Ministers Office
FAO	Food and Agriculture Organisation
FFS	Farmers Field Schools
FHH	Female Headed Household
HBS	Household Budget Survey
HIV	Human Immunodeficiency Virus
IFAD	International Fund for Agriculture Development
IFRC	International Federation of the Red Cross
IPPM	Integrated Pest Production Management
MALE	Ministry of Agriculture, Livestock and Environment
MHH	Male Headed Household
MoLYWCD	Ministry of Labour, Youth, Women and Children Development
MoHSW	Ministry of Health and Social Welfare
MVC	most vulnerable children
NAEP	National Agriculture Extension Programme
OVC	Orphans and Vulnerable Children
PADEP	Participatory Agricultural Development and Empowerment Project
PLHIV	People Living with HIV
PLWHA	People Living With HIV/AIDS
PMTCT	Prevention of Mother to Child Transmission
PPD	Plant Protection Division
TAC	Technical AIDS Committee
RGoZ	revolutionary Government of Zanzibar
UNAIDS	United Nation Programme on HIV/AIDS
UNICEF	United Nation International Children Emergence Funds
USAID	United States Agency for International Development
TB	Tuberculoses
ZAC	Zanzibar Aids Commission (ZAC)
ZACP	Zanzibar AIDS Control Programme
ZAPHA+	Zanzibar People Living with HIV/AIDS
ZANSP	Zanzibar National Strategic Plan
ZFSNSA	Zanzibar Food Security and Nutrition Situation Analysis
ZFSNP&P	Zanzibar Food Security and Nutrition Policy and Programme
ZGPRS	Zanzibar Growth and poverty Reduction Strategy
ZHAPMoS	Zanzibar HIV and AIDS Programme Monitoring System
ZSGRP	Zanzibar Strategy for Growth and Reduction of Poverty

## **Abstract**

Responding to HIV/AIDS epidemic is one of the biggest challenges facing Zanzibar. The National Strategic Plan on HIV/AIDS aims to address all factors (prevention and control) that fuel the spread of the disease. Food insecurity is regarded as one of the fuelling factors. This report explores the potential of intercropping as a way to mitigate the impact of AIDS on food security. The study is conducted on the West District of Unguja Islands of Zanzibar from the mid July 2009 to mid August 2009. About ten villages were selected for this study. In total 40 HIV/AIDS affected households farmers were interviewed.

The finding of the study revealed that, in female headed household dependency ratio are higher (2:1), two members in the household depend to one female headed household while in male headed household one members is depend to one male headed household (1:1). Average household size has shown is higher to female headed household, the average number of female members in female headed household are of twice than the male counterpart. The study showed that not only HIV/AIDS is a compounding factor to labour shortage in food security but also malaria and TB are other diseases destroyed the life of family members reported in this study, however AIDS was found to increasing consequence in the household. There is high malaria and tuberculoses (TB) cases reported in this district surveyed.

The study showed that most of the female headed household use household labour for land preparation, planting, weeding, harvesting and post harvest in both cropping seasons of long and short rain in west district of Unguja island Zanzibar. The finding also revealed that FHH are mostly involved on food crops like cassava, cowpeas, sweet potato and vegetables. This has implication that, most FHH relies on agriculture for food security, while MHH were also prefer to grow cash crops like coconut and mango.

Beside impact of HIV/AIDS in food production and security, there are other factors reported in this study contributing to low production which led to food insecurity to HIV/AIDS affected household. The study find that; insufficient knowledge in intercropping, shortage of labour, insufficient inputs such as seeds, fertilizers, pesticides, insufficient land in particular to female headed household and bad weather are also mentioned by respondents in this survey study. In the case of land ownership in the west district of Zanzibar. The result showed that, Male headed household own larger piece of land. Land ownership favors more to man than woman when their parents died. The study showed that all farmers were use intercropping farming system for food security. In response to the production of crops in intercropping, the findings showed that cassava, cowpeas, maize, sweet potato and vegetables produced high yield in the field for both affected HIV/AIDS male and female headed household.

The study showed that most of the (30) respondents agree that intercropping could save labour, ensure food security and reduce crop failure in the field. Intercropping thus has a potential as a coping strategy to overcome food shortage and inadequate nutrition to HIV/AIDS affected households. However, during the interviews it become clear that this potential is not realized, because of insufficient knowledge about intercropping, insufficient inputs such as seeds, fertilizers, pesticides, and landless in particular to female headed household and bad weather are also mentioned by respondents in this survey study. The study showed that most of the HIV/AIDS affected household rely on friends and experience for agriculture information.



## **Chapter1.: Introduction**

This chapter gives information on Zanzibar and livelihoods, the HIV/AIDS epidemic in Zanzibar. It also gives an explanation on the relation between HIV/AIDS and food security.

Zanzibar with a total area of about 1660 km<sup>2</sup> is among the highly populated Island with an estimated population density of about 400 persons per square kilometer. Of the total area available, about 49 percent is considered to be suitable for agriculture. About 70% of rural households in Zanzibar depend on food subsistence? agriculture as their livelihood. The majority of them (99.7%) are involved in either sole crop production or in mixed crop and livestock production (ZFSNSA, 2006). Agriculture is the backbone of household food and livelihood security for millions of rural population. People whose agricultural livelihoods are secure are able to advance further in agricultural activities as well as diversify into other activities. At the same time, agriculture is susceptible to various shocks including the HIV/AIDS epidemic. This is particularly so in the Zanzibar settings where social capital is the main form of social security. ASP, 2002, reveals that inadequate food supply and low incomes have led to inadequate food intake especially amongst pregnant mothers and children. About 50% of Zanzibar children in rural area especially those under-five years of age suffer from malnutrition due to insufficient food and lack of balanced diet meals in their household.

### **1.1.HIV and AIDS in Zanzibar**

HIV prevalence in the general population in Zanzibar stood at 0.6% by June 2002 (ZAC, 2007) and it had been reported to increase to about 0.87% at the end of 2005 as shown by a sentinel HIV surveillance survey at antenatal clinics (MoHSW, 2006). The increase in percentages of its prevalence is a factor that calls for an urgent, concerted and comprehensive effort to arrest and reverse the trends. Consulted literatures also show that HIV prevalence rates are higher in some categories of populations in Zanzibar depicting a type of concentrated epidemic. For instance, 86% of the current prevalence is in the population with the age of 20-49 years and the mostly affected being between 35-39 years. It is worth to note that HIV prevalence in Injection drugs Users (IDU) is 28.6%, this affects mainly young people who are the potential leaders and workforce of the nation. This is a grave situation because this category makes the work force of the country. A prevalence rate among women and girls is four times higher than males and this is explained by their biological, cultural and economic vulnerability (MoHSW, 2005).

The rural communities are affected by high prevalence of diseases, including AIDS, malaria, acute respiratory infections and fever impacting upon overall well-being of people (with under five and women particularly vulnerable). This has contributed to low food production and negatively affecting household earning capacity while increasing public and private health expenditures. HIV infection should be regarded as amongst the underlying causes of high level of malnutrition at individual and household level. An additional element contributing to individual and household level food security is the fact that the disease has distinct gender impacts (ZFSNP, 2008).

HIV infection and patient care activities may reduce household on- and off-farm labour quality and quantity, in terms of productivity and nutrition. When persons fall sick and eventually die, the affected households face food insecurity and mostly consume low quality food because of the decline in food production and reduction of number of crops grown.

Concurrently, the number of male youth involving in agriculture sector in Zanzibar is declining every year and most of them decide to engage in tourist sector. However, most of those who abandon and rush to tourism are employed in casual labour with low payment due to lack of knowledge (Budget speech of Ministry of Trade, Investment and Tourism, 2007, Zanzibar). In return the burden of sustaining families falls mostly on women who are the main food producers (ZFSNP, 2008).

## **1.2.HIV impact mitigation activities in Zanzibar**

In response to HIV the Revolutionary Government of Zanzibar (RGoZ) took early action after diagnosed and report of the first three cases in 1986 at Mnazi Mmoja hospital. The Ministry of Health and Social Welfare (MoHSW) led a newly established technical committee to address issues on HIV as a disease of public health importance. Furthermore, the RGoZ established a special task force under the Chief Ministers Office (CMO) with Ministerial Principal Secretaries as its members (ZAC, 2003). Under the leadership of the technical committee, successive Medium Term Plans (MTP I-III) were formulated and implemented with various levels of achievements (ZAC, 3003). In 1987 MoHSW established Zanzibar AIDS Control Programme (ZACP) to lead on respond to the epidemic while Technical AIDS Committees (TAC) was formed in 2004 in all RGoZ ministries. In June 2002, an act by the House of Representatives led to creation of Zanzibar AIDS Commission (ZAC). The commission has national entity responsible for coordinating the HIV Response within all sectors. Soon after the establishment of ZAC, situation analysis was carried out with a fourfold purposes (1) to analyse the status of the HIV epidemic, the determining factors and drivers of the epidemic, (2) to assess to which MTP III was implemented as a multisectoral plan, (3) to indentified achievement and constraints encountered, (4) to propose recommendation and the wayforward as inputs into the formulation of a Multisectoral Zanzibar National HIV and AIDS Strategic Plan (ZANSP)

The HIV and AIDS education and communication projects in community have contributed to the reduction of stigma of People Living with HIV and AIDS (PLHIV) and their families. Local authorities in communities also involved PLHIV in the implementation of (Shehia) ward sub projects through community sensitization and providing testimony. The involvement of faith based leaders (Christians and Muslims) within the community has boosted the morale of PLHIV and encouraged communities to provide moral and materials support for PLHIV. Other currently HIV mitigating activities in Zanzibar include Community Home Based Care (CHBC) services; Income generating activities; Peer education and counseling; Provision of knowledge on positive living through counseling and psychological support to PLHIV and OVC (ZAC, 2007).

Orphans and most vulnerable children (MVC) often lack basic human needs were provided with basic external children support in terms of nutrition, school fees and medical support( ZAC, 2007). Furthermore Zanzibar launched a major campaign on stigma reduction to address stigma in the families and communities as well as self stigma which cause PLHIV to shy off from receiving HIV services like Prevention of Mother to Child Transmission (PMTCT) and Home outreach support. However, little or no effort has been taken to address mitigation of impact of AIDS on food security in Zanzibar. Therefore, this study about HIV and AIDS on food production and its impact in the rural areas provides the first information related to HIV/AIDS affected households and food security.

Child malnutrition is strongly present in Zanzibar with 23 percent of fewer than five years being stunted, 6 percent wasted and 19 percent underweight. Due to food and nutrition

insecurity, anemia is reported at very high levels of 75% for under fives and 63% for women in the age of 15-49 (DHS, 2004/05). This situation is taken as a predisposition of chronic diseases related to diet and nutrition including diabetes, hypertension, cardio-vascular diseases, cancer, TB and dental cases.

The incidence of vulnerability to food insecurity and nutrition broadly differs per livelihood zone. The most vulnerable populations are found in Micheweni, Wete and Chakechake districts in Pemba and South, urban and North A districts of Unguja. Rural areas, particularly the coastal plains and coral areas are described as highly disadvantage areas. Juma and Saleh (2008) reported that, vulnerability to Food insecurity in North A is also related to agro ecological conditions, that dictates the livelihood options available for households within the limits of geographical boundaries. In interior Coral rag areas such as Kijini Kigunda and large part of Fukuchani and Tumbatu, the assessment revealed more than 80% of the HHs are vulnerable to Food insecurity because of limited options other than coral rag farming which is susceptible to repeated shortages and unpredictability of rainfall.

### **1.2.1. The AIDS and food production in Zanzibar**

The HIV/AIDS epidemic is associated with low production through reduction of land area under cultivation and reduction in the ability to control crop pests and weeds. Some families switch to less labour-intensive crops or activities and may abandon traditional practices, such as mulching<sup>1</sup>, which replenish the soil or reducing the number of crops under cultivation (The farmer who is living with HIV Mr, Banana explained). Needs of cash of AIDS affected families in West district of Zanzibar forces them to practice shifting cultivation, changes in cropping patterns and shift from subsistence production to cash/food crop production (PPD unpublished report). They can sometimes sell domestic animals which provide manure, thus reducing soil fertility in their fields.

It's estimated that more than 41% of food in Zanzibar are imported from Tanzania mainland. Rice is imported from Asian countries. Every year Zanzibar witnesses food insecurity of about between the months of December to early March (Plant Protection Division, unpublished report on Routine data). The food shortage is a result of removal of agricultural subsidy by the government which led to poor production (Juma and Saleh, 2008). Food shortage in the western district and northern districts was estimated to hit an average of over 30% of rural household. Most of the affected family members were living on one or two meals per day (MALE, 2007).

### **1.3. Zanzibar's food security situation.**

Low production of food caused by bad weather of unreliable rainfall especially during short rains that beginning in September to end of November. In early 90s the Government of Zanzibar removed agriculture subsidies to farmers that were initial cause of the reduced crop production to small scale farmers. Concurrently, poor income of household, lack of labour, increasing expenditure for sick person in the household and insufficient knowledge on intercropping to small scale farmers compounded the productivity. For the West district of Zanzibar with highest prevalence of HIV/AIDS, the aforementioned factor was the sources of

---

<sup>1</sup> Mulching: Mulch is any type of material that is spread or laid over the surface of the soil as a covering. It is used to retain moisture in the soil, suppress weeds, keep the soil cool and make the garden bed look more attractive.

food insecurity to the HIV/AIDS affected household. Food insecurity in the west district also contributed by increasing rural urban migration of youth who are active manpower for crop production (Own observation interview). The worsening life situation in the district resulted into increase of engagement in risky livelihood options, like commercial sex and robberies. This situation was fuelled by drug abuse as the number of youth involved.

Domestic production is largely dependent on small holder farming which has been reported to decline due to, bad weather and removal of agriculture subsidies by the Government (MALE, 2007). About 70% of the agricultural labour force consists of women who generally have inadequate knowledge, capacities and limited access to productive resources necessary for improvement of productivity. Consequently, imported foods constitute a large proportion of the food available and consumed in Zanzibar. Estimations indicate that about 41% of Zanzibar annual food requirement are accounted for by food imports.

#### **1.4.Zanzibar intercropping and cropping seasons system**

Farming for food production is a major activity for the majority of Zanzibaris. Major food crops include rice, cassava, sweet potatoes, bananas, plantains, yams and coco yams. The staple food in Zanzibar is rice but domestic production accounts for a small share of total consumption, the rest is imported. With regard to food crops, Zanzibar is not self sufficient, with imports accounting for more than 50% of total food consumption. The challenge is to attain food security for Zanzibar, through a combination of increased domestic production and increased import capacity.

The Zanzibar cropping year runs from October through September the following calendar year. With the exception of few locations, Zanzibar receives two main rain seasons per cropping year, including the long (masika) rains falling from March through June and the short (vuli) rains falling from October to December. The average annual rainfall is 1700 mm. While the vuli season that peak in November account for approximately 29 percent of the annual rainfall, masika rains peak in April and contribute nearly 52 percent of annual rainfall. Drizzles and rainfall traces, which are generally off-season, fall in the months of June to September and January-February. Spatially, both (vuli) Short rains and (masika) Long rains are reliable in areas characterized by the deep fertile soils (ZFSNSA, 2006).

#### **1.5. Percentage of population below the food poverty line in different districts of Unguja Island**

The incidence of vulnerability to food insecurity and malnutrition broadly differs among district livelihood zone. The most vulnerable population are found in North A and B with about 12.18 and 12.06 respectively. The South and West districts represent 9.73 and 9.54 while the central and urban districts are the lowest of 8.35 and 7.75 (see the map below). Rural areas, particularly the coastal plains and coral rag areas are described as highly disadvantaged areas. As Highlighted in the ZFAN Policy, risk factors to food and nutrition insecurity can be distinguished at national, household and individual levels.

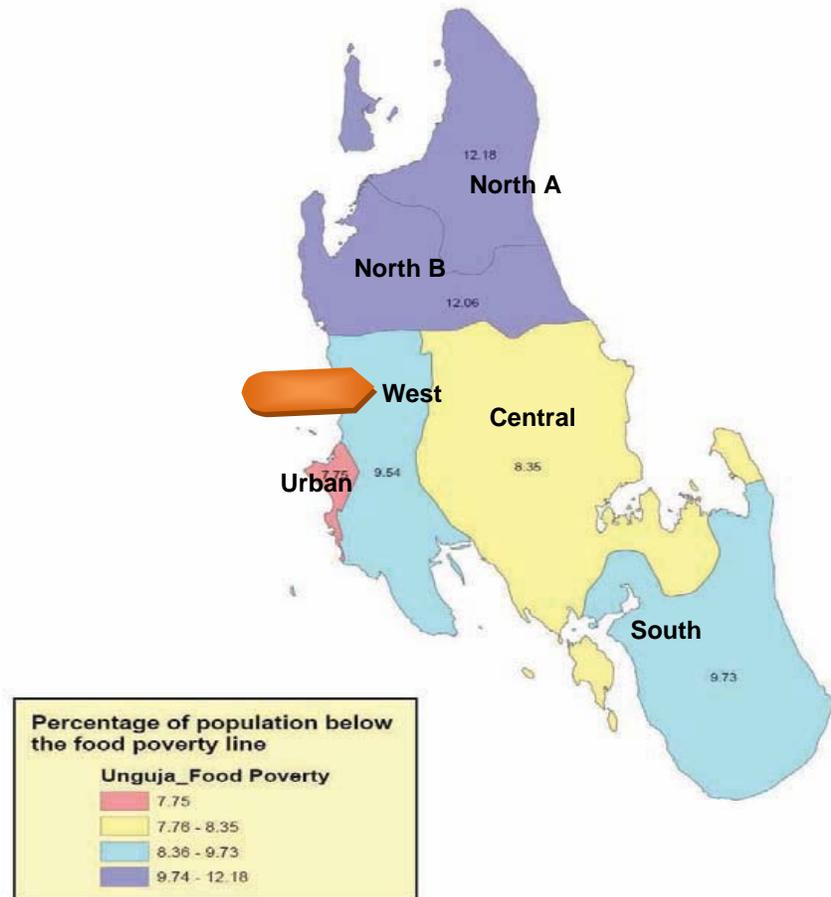


Figure 1. 1: Percentage population below food poverty line  
 (Source: Zanzibar Food Security and Nutrition Programme, 2008)

### 1.6. Goal, mission and vision of my organization

The goal of the Plant Protection Division in Zanzibar is to conduct regulatory, inspection, and educational programs that protect the health of plants and increase yield per unit area of agriculture production. Mission of the organisation is to pursue a national leading role in plant protection by conducting superior research, delivering quality and innovative knowledge, and extending technology to improve agriculture, the environment, and well-being of small scale farmers. Its vision is to be leading agent towards achieving plant healthy for food security and safety, creation of employment, income generation and sustainable agriculture.

### 1.7. My position in organisation

I am the assistant head of research unit of Plant Protection Division, under this unit there are two sub units, one is plant pathology which deals with plant diseases and second is vector control which deals with entomology and biological control. My main task is to promote food production by conducting scientific research on plant diseases and pest control and provide training on new agriculture innovations for agriculture extension workers and subject matter specialist in Zanzibar.

### **1.8. Problem statement**

Many households on Zanzibar are impacted by AIDS, among other a reduction of labour available for agriculture, their main source of livelihoods. Zanzibar is also prone to food crises.

Plant Protection Division (PPD) and Zanzibar IPPM Project have recognized potentiality of intercropping in mitigating food insecurity to AIDS affected household in the west District of Unguja Island in Zanzibar. However, baseline information on farming system based on intercropping in AIDS affected household in the district was lacking.

### **1.9. Research Objective:**

The aim of this study is to identify how potential of intercropping as mitigating strategy for AIDS affected households for reducing food insecurity. The outcome of this study will be used to plan the responses on food insecurity to AIDS affected households in Zanzibar. So make sure that you come back to this in your recommendations!!!!

### **1.10. Main research question:**

Under what conditions can intercropping mitigate impact of AIDS on food security for HIV/AIDS affected household in rural areas?

### **1.11. Sub-questions.**

- How do AIDS impact food security?
- How do different types of intercropping contribute to food security for AIDS affected household?
- What are the crops produce more productions in the household?
- What type of intercrop responds best to labour constraints caused by HIV?
- What are the difference on land ownership on crop production of AIDS affected household
- What are farmer's opinions of AIDS affected households about intercrop as a mitigation strategy?

In order to achieve the objectives of this study, the conclusion is to introduce intercropping farming system to AIDS affected household. Strengthen agriculture extension services to introduce new agriculture intercropping technology which will response on food insecurity. There is no study on impact of HIV/AIDS on labour and food security and response or mitigating food insecurity to AIDS affected household.

## **Chapter2.: Conceptual framework and Literature Review**

### Introduction

This chapter covers the impact of AIDS on rural livelihoods and responses to mitigate this impact, relations between HIV AIDS and food security, conceptual frame work. Definition of concept, and Importance of Intercropping for AIDS affected rural household.

### **2.1 Impact of AIDS on labour in food production**

Productivity is initially reduced when the AIDS-infected person is ill, and later the supply of household labour declines even further with the death of that person. Moreover, more than one adult per family is most likely infected, given the heterosexual nature of HIV transmission in Africa (FAO, 1997). In the Ugandan village of Gwanda, many households appear to be experiencing reductions in labour quality and quantity as a direct result of the HIV/AIDS pandemic. Labour-intensive farming systems with low levels of mechanization and agricultural input use are particularly vulnerable to the impact of HIV/AIDS as the economic return to labour tends to be lower (FAO, 1997).

Many of the studies assessing the impact of HIV/AIDS on agriculture have been conducted under the auspices of the Food and Agriculture Organization (FAO). Of the AIDS impact studies conducted so far, the majority have dealt with the rural world, that is, agriculture and livestock. One of the main impacts of HIV/AIDS on agriculture is its impact on food security. For example, a survey carried out in 1997 in Zimbabwe, a country with an adult prevalence rate of more than 25 per cent, estimated production loss in AIDS-affected households. The survey, conducted by the Zimbabwe Farmers' Union, found that agricultural output declined by nearly 50 per cent in the households affected by AIDS (Kwaramba, 1997).

Maize production by smallholder farmers and commercial farms declined by 61 percent as a result of illness and deaths from AIDS disease. Those production losses could result from a number of factors, including labour shortage and shifting production patterns. However, according to Kwaramba, at that time the Zimbabwe data did not indicate a dramatic switch from cash to subsistence crops. In Côte d'Ivoire, a 1997 study found that switching to food crops rather than cash crops led to a drop in production by two thirds of previous levels (Black -Michaud, 1997). In a study conducted in Burkina Faso in 1997, it was found that in two villages, Sanguié and Boulkiemdé, shifting work patterns and an overall reduction in food production had occurred as a result of the HIV/AIDS epidemic. The same study found that net revenues from agricultural production had decreased by 25 to 50 per cent (FAO, 1997). The Government of Swaziland also reported a 54 percent drop in agricultural production in households where at least one adult member died from AIDS (Wall Street Journal, 2003).

HIV/AIDS frequently has severe consequences for rural widows of AIDS victims. In sub-Saharan Africa and Asia, women contribute to more than half the food production and are usually involved in the most labour intensive farming activities <sup>2</sup>(UNAIDS, 2002). However, in areas where women are not permitted to inherit property, they may lose access to land and other assets when their husband dies (FAO, 2003).

A study in the United Republic Tanzania showed that a woman whose husband was sick was likely to spend 45 per cent less time on agriculture than if the husband were healthy. In Kagera, a survey showed that, on average, adults in households that experienced a death

---

<sup>2</sup> UNAIDS (2002) Report on the Global HIV/AIDS Epidemic.

spent five hours less on farming during the previous week than those without a death (Mutangadura, 2000). In Kenya, a study found that the commercial agricultural sector was facing a severe social and economic crisis caused by HIV/AIDS (Rugalema, 1999a). The loss of skilled and experienced labour to the epidemic is a serious concern. However, it was difficult to quantify the impact of the epidemic in terms of increasing costs. In Namibia, worker-deficient households cultivate less land and have fewer cattle and less non-farm-related cash income (Mutangadura and Mukurazita, 1999).

In countries or areas heavily affected by the HIV/AIDS epidemic, the time required to care for the sick and seek medical assistance often had an impact on time available for agricultural production. The outcome might be less timely farming practices, resulting in reduced yields and, over time, a general decline in household welfare.

A study conducted in Ethiopia showed the reduction in agricultural labour time as a result of HIV/AIDS: the number of hours per week in agriculture fell from 33.6 hours in non-afflicted households to between 11 and 16 hours in afflicted households (Black-Michaud, 1997). AIDS is expected to have a greater impact in the future. According to estimates by FAO, between 1985 and 2000, in the 27 most affected countries in Africa, 7 million agricultural workers died from AIDS, and 16 million more deaths were likely to occur in the following two decades. In 12 countries, including the 10 most affected African countries, labour force decreases ranging from 10 to 26 percent are anticipated (table 15). Namibia is expected to suffer the most in terms of loss of labour force by 2020 (26 per cent of its labour force), followed by Botswana.

Another feature of the HIV/AIDS epidemic is that its impact may be observable only when the epidemic reaches the mortality stage of AIDS, with people dying in large numbers. It is therefore important to design measures that allow the prediction of the impact of the epidemic in the future as well as in the present. A study conducted by the United States Department of Agriculture addressed that concern by projecting the impact of AIDS on production (Shapouri and Rosen, 2001). The study found that in the most affected countries in Africa, slow growth in agricultural productivity and the overall economy resulted in growing food insecurity, with a substantial gap between production and needs projected for 2010 in many countries. Food insecurity is measured by the nutrition gap, which represents the difference between projected food supplies and the amount of food needed to meet per capita nutrition standards at the national level. In Kenya, for example, grain production in 2010 is projected to be 12.1 per cent less than the amount needed (table 16). Increasing reliance on imported grain and food aid will be necessary to meet nutrition requirements (Shapouri and Rosen, 2001).

## **2.2. Impact mitigation on AIDS household labour**

AIDS is a compounding factor on labour shortage on agriculture in many rural household in the developing countries (FAO, 2002, 2003). In many sub-Saharan and southern Saharan African, Households, communities, governments and development partners are implementing a variety of interventions to mitigate the impact of the epidemic on smallholder agricultural production. However to date, documentation and dissemination of interventions to mitigate the impact of AIDS on smallholder agricultural production and food security is low (FAO, 2002). Households and communities affected by the HIV/AIDS pandemic often devise means of coping with the disease itself and the associated problems. Hiring of extra labour to assist in agriculture is one of the coping strategies for affected households. This however puts further pressure on the household's income, if the hired labour is paid in cash. Children

have also been increasingly called upon to assist with household chores and agricultural activities in affected households. A study conducted by Ray Bruno Agong (2008) revealed that labour exchange activities carried by the groups, with the exception of youth are mainly of agriculture in nature like; land opening, planting, weeding, harvesting and post harvest handling of crops. In the youth group, labour exchange is mainly of income generating activities like; brick making, seedling raising and tree planting.

The study conducted by Barnett and Grellier (2003) revealed that Community labour sharing is a common coping response to the need to support affected households in many communities in the sub-region. Labour-sharing groups facilitate land preparation, weeding, or harvesting, thereby helping to reduce total cultivation time and enabling a greater number of households to overcome problems of timeliness associated with the crop cycle. Labour-sharing clubs have been reported to be effective in relieving HIV- and AIDS-related labour shortages in some communities in Malawi and Zambia Households losing labour to illness and caring, labour-saving technology such as use of short maturity variety and less labour intensive crops like cassava especially for women will be particularly valuable. This may be in farming itself, but it may be more pressing and feasible to reduce time taken on other tasks, such as drawing water. Ideally, extension services need to be able to provide additional options appropriate for AIDS affected households (Rachel Slater and Steve Wiggins, 2005).

In Ugandan village of Gwanda, many households appear to be experiencing reductions in labour quality and quantity as a direct result of the HIV/AIDS pandemic. Labour-intensive farming systems with low levels of mechanization and agricultural inputs are use particularly to vulnerable to HIV/AIDS affected families as the economic return to labour tends to be lower as one of coping strategy and labour saving technology (FAO, 1997). One important factor relating to AIDS mitigation targeting is the appreciation of the element of differential vulnerability of the household to AIDs impact. As Barnet and Whiteside (2006) indicate that in exactly the same way as not all people or communities are susceptible to infection, so not all will be affected in the same way or to the same degree.

### **2.3. Relations between HIV AIDS and food security.**

There is a two-way relationship between HIV/AIDS and food security. AIDS has an impact on people's livelihoods, reducing food security through illness and death; meanwhile, food insecurity and poverty fuel the HIV epidemic as people are driven to adopt risky strategies in order to survive. Ultimately, HIV/AIDS impacts on the livelihood outcomes of households. Households affected by HIV/AIDS usually have less income, increased vulnerability and reduced food security (Paul Harvey, 2004). This is likely to leave them more vulnerable to other shocks, such as drought. If it is severe enough, the impact of HIV/AIDS could result in destitution and households becoming dependent on external assistance.

HIV/AIDS is an additional burden on already vulnerable households in sub-Saharan Africa. It also affects food security in ways that create particular types of vulnerabilities. The fact that it kills predominantly prime-age adults and that it clusters in households; the gender specificity of impact; and the way in which HIV/AIDS interacts with malnutrition are all factors that must be understood and taken into account in providing humanitarian relief in the context of an HIV/AIDS epidemic (Paul Harvey, 2004).

Several population factors play an important role in the increasing and changing nature of the demand for food, while also constricting supply and access to food. AIDS is critical compounding factor and clearly played a major role in worsening the depth of the 2002 food crisis and prospects for livelihood recovery. This fact is highlighted by amongst others the UN Special Envoy (SE) for Humanitarian Needs in Southern Africa, and the International Federation of the Red Cross (IFRC). The SE report: "Next Steps for Action in Southern Africa" (April 2003), draws attention to the negative relationships between the pandemic and poverty, food insecurity and, ultimately, the social fabric of Southern African societies (UNAIDS, 2008).

Muller, T R, 2005, 2005 reported that, the relationship between HIV/AIDS and food security is multidimensional. On the one hand, food insecurity is believed to biologically increase the risk of HIV infection, with malnutrition increasing the risk of transmission of the virus. Muller T R, 2005, reported that food insecurity may force individuals to adopt livelihood strategies that lead to greater susceptibility to infection. A survey report on HIV/AIDS afflicted household in South Africa found that almost half of the participating households were having insufficient access to food at times and children often went hungry, resulting increasing childhood malnutrition (Steinberg, M., S. Johnson, G. Schierhout, D. Ndegwa, K. Hall, B. Russell and J. Morgan (2002). In addition, research has shown that the most immediate problem for many Aids afflicted female headed households is not medical treatment and drugs, but food and malnutrition (Topouzis, 1998, Black-Michaud, 1997).

The great majority of the populations in the country are most affected by HIV/AIDS live in rural areas. In many African countries, farming and other rural occupations provide a livelihood for more than 70 per cent of the population. Hence, it is to be expected that the HIV/AIDS epidemic will cause serious damage to the agriculture sector in those countries, especially in countries that rely heavily on manpower for production (UNAIDS, 2008)

#### **2.4. Conceptual framework**

AIDS is a compounding factor on food insecurity in the rural household. AIDS courses death and illness, and reduce labour availability on food production in the household, both directly through affecting productive members of the household, and indirectly through labour reallocation to care for the sick. Both of these effects mean that during the rainy period that is a period of high labour demand for land preparation, sowing and weeding. Labour demand for farm work may remain unmet, as urgent domestic tasks nursing of AIDS infect person are forced to take primacy. The impact of reallocation of labour to domestic work has led to reduce land for cultivation. The household cropping system also are forced to change and focusing on less labour intensive crops such as cassava.

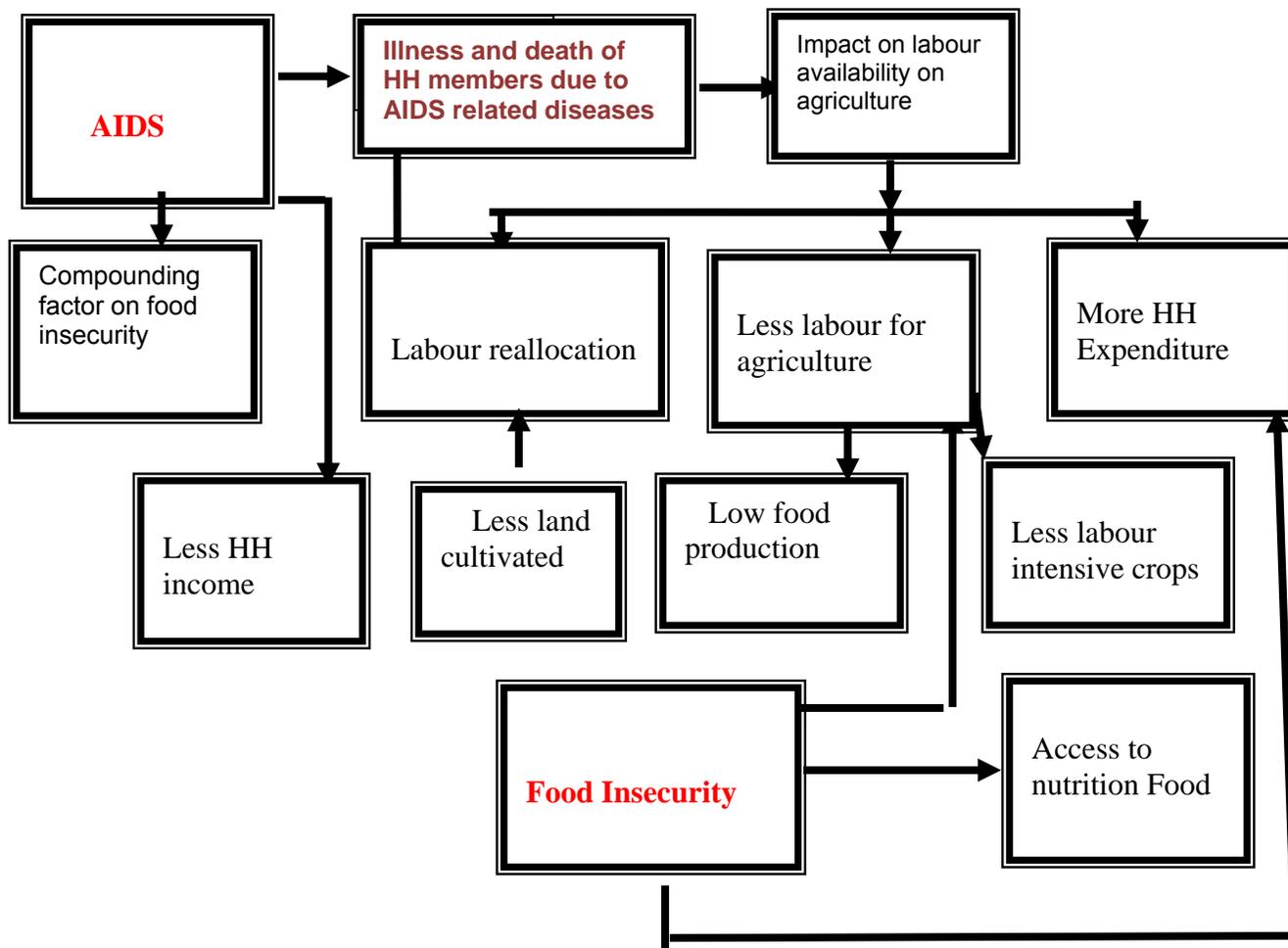


Figure 2. 1: Conceptual framework: AIDS and agriculture in a household  
 (Source: author of report 2009)

## 2.5. Definition of concept

**Intercropping** is the agricultural practice of cultivating two or more crops in the same space at the same time. ([www.fao.org/docrep/009](http://www.fao.org/docrep/009). Access, 2009)

**Rely intercropping:** A form of intercropping in which two or more crops grow simultaneously during part of the life cycle of each; that is, a second crop is planted before the first crop matures. ([www.fao.org/docrep/009](http://www.fao.org/docrep/009). Access, 2009)

**Mixed intercropping:** growing two or more crops together in no distinct row arrangement. ([www.fao.org/docrep/009](http://www.fao.org/docrep/009). Access, 2009)

**Row intercropping:** growing two or more crops at the same time with at least one crop planted in rows. ([attra.ncat.org/attra-pub/intercrop.html](http://attra.ncat.org/attra-pub/intercrop.html). Access, 2009)

**Food security:** According to the Food and Agriculture Organization, food security exists "when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.( [www.fao.org/docrep/009](http://www.fao.org/docrep/009). Access, 2009)

**Household:** All persons living under one roof or occupying a separate housing unit, having either direct access to the outside (or to a public area) or a separate cooking facility. Where the members of a household are related by blood or law, they constitute a family. (BusinessDictionary.com. Access, 2009)

**Household head** is the man, woman or child recognized as such by other household members. This person makes (many of) the key decisions and has the primary responsibility for managing household matters.( [www.fao.org/docrep/009](http://www.fao.org/docrep/009). Access, 2009)

**HIV/AIDS affected household.** As a household member fall sick due to HIV/AIDS that affect the health and productivity of those infected with the virus because a person suffering from debilitating HIV or AIDS is unable to do a full workload, resulting in reduced income and reduced capacity for future production. Moreover, HIV-linked illness and AIDS have a depressing effect on the productivity of healthy people because of the absenteeism caused by care giving or attending funerals. ([www.ifpri.org/pubs/books](http://www.ifpri.org/pubs/books), Access, 2009)

**Gender.** Refers to the social attributes and opportunities associated with being male and female and the relationships between women and men and girls and boys, as well as the relations between women and those between men. Its distinguish between sub-groups of female-headed households when comparing their poverty with that of male-headed households. ([www.itu.int/gender/about/gender](http://www.itu.int/gender/about/gender). Access, 2009)

## **2.6. Importance of Intercropping to AIDS affected rural household**

Maintain soil fertility for improving food production remains as one of the challenge in agricultural production to small scale rural farmers in developing countries. Intercropping is one of the options available to maintain soil fertility and increase crop yield to poor people affected with HIV/AIDS. Other benefits of intercropping are risk spreading, weed control which is labour saving to farmers, conserving moisture and decreasing incidence of pest and diseases in their crops. Farmers who adopted intercropping of maize and cover cropping (beans, cowpeas, vegetables and mucuna) benefited from higher yields of maize, cassava, millets, sorghum and vegetables with less labour input on weeding and fertilizer application. Some advantages of using intercropping systems are to: ensure food security all year round, replenish soil fertility and reduce cost of fertilizers and labour, control weeds, pest and diseases of the plant, improve nutrition status and conserve moisture in the soil (Andrews and Kassam. 1976, PPD, 2006).

In Eastern Africa, most almost all the small scale farmers suggest that the most important intercrop combinations are: maize with beans, cowpeas and pegen peas. It has been suggested that the small scale farmers intercrop maize and legumes for the following reasons: to maximize the productivity of land, particularly in high rainfall areas, where land is often limited; to produce variety of foods of the farm family that is preferred in the diet and minimize risk associated with unreliable rainfall (Joel K. Ramson, 1990). Though the land is mentioned as constraints to small scale farmers, HIV and AIDS is emerged as compounding factor on labour shortage in the rural household. It is estimated that hand weeding may

utilized 35-70% of total labour in agriculture. Poor rural households seldom allocate the entire labour time of all their members to a single pursuit. Intercropping is an essential farming system of their livelihood strategy. However, the degree of farming intercropping and benefits differs from one household to another depending on household resources, constraint and opportunities presented by the internal and external environment. In general, the greater the degree of using intercropping, the greater the ability to cope with food shocks in household. For example, in a situation of crop failure, the shock to the household income can be absorbed at least in part if a portion of the household's labour time is engaged in another activity than agriculture (PPD unpublished report).

In a situation of failing food crops, the income shock will be minimized if part of the labour time has been devoted to the production of cash crops or caring sick person in the household. The figure 2.1 revealed that the importance of intercropping in term of labour saving in weeding time, intercropping suppress weeds and hence farmers do not weeds and saving time to other livelihood options. The crop like legumes when intercrop with maize cover the soil surface and conserve moisture content in the soil and enhance plant growth and development, in this situation the cost of irrigation will be reduced. Since intercropping is planting of more than one crop at same piece of land, the risk of crop failure is also reduce. Intercropping also improve access of food to household; example cow peas contain high rate of protein, while cassava and maize contain starch and therefore reduce malnutrition and improve health of household (Andrews and Kassam. 1976).

A multi-sectoral response to the epidemic needs to take into account the linkages between human capital on labour shortage and HIV/AIDS epidemic rural areas. To this effect, there is a need for a shift in analysis from the impact of the epidemic to the interface between, food security and intercropping system as a response to food insecurity to AIDS affected household as showed above in Conceptual frame work,

## **Chapter 3. Methodology**

### **Introduction**

This chapter presents the methodology used in this study. It starts with brief of target group, study area followed by research design, selection of the village and respondents and criteria used for selection, data collection method, data analysis and summary of research respondents. The villages included in the study are: Kizimbani, Dole, Bumbwisudi, Kinumoshi, Kianga, Mwakaje, Kisauni, Selem, Mwera, Kisauni and Kidichi

### **3.1.Target group**

The target group is HIV/AIDS affected household farmers experiencing food insecurity for the last five years. These farmers are active members of Farmers Field Schools (FFS) of the IPPM, NAEP and PADEP program in the village and were the head of the household.

#### **3.1.1.Study area**

The study was conducted in the west districts of Unguja island of Zanzibar. It is a second to urban district in terms of population density. The district bordering with North B, Central and Urban districts (figure 1).

#### **3.1.2.Sites selection criteria**

This district is selected for this study because of it host second largest number of HIV/AIDS cases of about (22.5% of all people tested in Unguja island. The district general population, are 68.7% are women and 31.3% are men.). As a consequence the district is characterized by increasing number of orphans as well as food and nutrition insecurity (ZAC, 2006). Village selection was firstly based on previous program of (Farmers Field Schools and Integrated Pest Production Management) FFS/IPPM and PADEP projects that have been in operation in the area for the last 5 years. The selection was also based on formal and informal information of HIV/AIDS situation in the villages from district HIV/AIDS ZHAPMoS coverage report. A total of ten villages were then randomly selected out of more than 50 villages from the districts, each village provided four household respondents (two male and two female farmers) that were also obtained through random sampling. This gave a total of 40 household farmers composed of 16 male and 24 female, headed households affected with HIV/AIDS and practice intercropping. Other particulars of the two categories of respondents are: -

1. Female headed household (FHH) practicing intercropping farming system that is living with HIV/AIDS or related chronic diseases like tuberculoses (TB) or taking care of people living with HIV/AIDS or chronic diseases in the last five years. Household head must be from 15 to 60 years of age.
2. Male headed household (MHH) practicing intercropping farming system that is living with HIV/AIDS or related chronic diseases like tuberculoses (TB) or taking care of people living with HIV/AIDS or chronic diseases in the last five years. Household head must be from 15 to 60 years of age.

#### **3.1.3. Data analysis**

The analysis in this finding was based on the household interviewed. Data collected from the in-depth household interviews was coded in computer. Statistical package for social science

Microsoft SPSS software and Ms Excel were use to analyzed quantitative data. The findings were presented in tables and figures as showed below

#### **3.1.4. Study design**

The study employed both qualitative and quantitative approach and was based on empirical data, review of literature and documents from Zanzibar AIDS Commission, Ministry of Agriculture and districts extension office, Tanzania AIDS Commission, journals and internet search. The researcher and district agricultural specialist of PPD prepared the scheme of the areas to be surveyed. The HIV/AIDS household respondents were selected through village medical clinics and people living with HIV/AIDS. The proportional of affected household used on survey were based on at least one active member from age 15-60 years old who is chronically ill, died or affected (Living) with HIV/AIDS in the last 5 years. The interviews were administered to 40 respondents and focused on demographic composition of the household, farm labour employed, intercropping system used and agricultural inputs used by farmers (Annex 1).The semi structure questionnaires was developed and used for data collection. The questionnaire was pre-tested to 3 respondents to check if the farmers will manage to grasp and answer the questions. The data were collected by researcher with the help of trained assistant and kept into the semi structure questionnaire. The study was planned to samples two categories of household.

#### **3.1.5. Data Collection**

The data were collected in three stages: Desk study, semi structure questionnaires by interviewing farmers (Annex 1) and Observation of the farmer's field and household situation. The materials that were used are Zanzibar budget speeches, Books, Districts documents and reports, ZAC reports, Zanzibar agriculture report and journals, government and private unpublished report, and internet search.

#### **3.1.6. Selection of respondents**

Random selection of 10 villages and 40 individual households were selected as mentioned above with close consultation of nurses and medical staff in the village health centers and one volunteer living with HIV. About 24 HIV/AIDS affected female headed household and 16 HIV/AIDS affected male household headed were identified. The reason of differentiate between MHH and FHH is, FHHs on the assumption that they were poorer than households headed by men (MHHs) and less able to improve their situation when they were HIV/AIDS affected.

#### **3.1.7. Ethical Consideration**

In many society HIV/AIDS is a very sensitive matter at National, household and individual level. Therefore in order to ensure that the study did not confront the ethics in data collection and information related to HIV and AIDS at household level, agreement was made between two parties on ethical factors when dealing with HIV and AIDS. This includes; benefits, risks, confidentiality, permission to use data and Informed consent.

**Table 3. 1: Summary of village surveyed**

<b>Village</b>	<b>No of respondents</b>	<b>MHH</b>	<b>FHH</b>
Kizimbani	4	2	2
Dole	3	1	2
Bumbwisudi	5	2	3
Kinumoshi/Miwani	5	2	3
Kianga	3	1	2
Mwakaje	4	1	3
Kisauni	4	2	2
Selem	4	2	2
Mwera	4	2	2
Kidichi	4	1	3
<b>Total</b>	<b>40</b>	<b>16</b>	<b>24</b>

**Source: Household Survey, 2009**

### **3.2. Study limitations**

- Unreliability of transport to reach farmers and heavy rain made field visits difficult.
- Since most methods used were quantitative, some key findings could not be quantified
- Some male headed household respondents were not open to provide information about farming, HIV/AIDS, farming system use and number of orphans they have.
- More difficult in finding HIV/AIDS affected male headed household.
- Some of respondents give condition of anonymously about the information given not to be publicized in my country or anywhere without their permission.
- Some respondents fear or refuse to answer the question about visiting of extension workers in their farms; this is due to the fact that they are close family relatives

## Chapter 4 Findings

This chapter presents findings. It shown details the demographic information of the interviewed households and participations of social and economic generation activities, Reasons for intercropping, factors contributing to poor intercropping, members of household suffered from HIV/AIDS related diseases, family labour, source of information for intercropping, Crops intercrops in row, relay and mixed intercrop, farmers opinion on best intercropping system to use during short and long rains seasons.

### 4.1. Demographic composition of household surveyed

Average household size has shown is higher to female headed household, the average number of female in female headed household are of twice than the male counterpart. The average number in male headed household shown (table 4.1) is almost equal number of both sexes. In male headed household the active member is higher in male than female headed house male as shown in table (4.1). The results have implication of labour in agriculture production by assumption that most female were involved in domestic labour on care of children and AIDS infected sick household member. The productive age in this district is 15-60 years old but in this study reveals that the average household range between 15-60 are the same in male headed household and differences are shown to female headed household (table 4.1). Also comparing the number of girls and boys under 14 years of age, the results reveals that girls number is higher than boy's counterpart in both male and female headed households. In the case of number of orphans in this study revealed that, both in male and female headed households have the number of orphans. However, the number of boys is lower in both household studied. In female headed household dependency ratio are higher (2:1), two members in the household depend to one female headed household while in male headed household one members is depend to one headed. This has the indication that in FHH has less prime age group to work in crop production. Furthermore, In this chapter below describe household labour sources shown that the female headed household depend on household labour for agriculture crop production than male household (table 4.4). Considering the economic condition of the female household head feeding large number of dependents has, not only implication to amount of food required but also the quality of food is likely to be below standard. In return this will be associated with vulnerability of household members to different types of diseases and probably deaths. For instance, the survey results reveal that in the last five years higher numbers of deaths were reported in female headed household than male headed household

**Table 4. 1: Demographic profile of household**

<b>Demographic profile in Average</b>	<b>MHH</b>	<b>FHH</b>
<b>Total average household size</b>	6.4	6.90
number of male	3.12	2.25
number of female	3.28	4.65
<b>Active labour on household members</b>	1.25	0.90
number of male	1.50	0.30
number of female	1.00	1.50
<b>household age &lt; 14years</b>	1.50	1.60
number of Boys	1.30	1.40
number of Girls	1.7	1.50
<b>household age 15-60 years</b>	1.56	1.40
number of male	1.56	0.62
number of female	1.56	2.25
<b>Average household age &gt;60</b>	0.34	0.33
number of male	0.25	0.21
number of female	0.43	0.46
<b>Number of orphans</b>	1.7	1.70
Number of boys	1.40	1.50
number of girls	2.00	1.90
<b>Number of orphans dropout from school</b>	0.66	1.05
Number of boys	0.20	0.45
number of girls	0.46	0.60
<b>Dependency ratio</b>	1:1.	2:1

**Source: Household Survey, 2009**

## **4.2. Impact of AIDS through illness and death**

### **4.2.1. Long illness**

The results revealed that in the last five years a total of 72 people suffered from long illness diseases in 40 household surveyed as shown in the table 4.2 above. The results indicate that in female headed household out of 24 respondents interviewed many of them said that malaria and tuberculoses are major diseases. TB and frequent diarrhea are known as AIDS related diseases in high prevalent areas. This has implication that AIDS related disease are reported to be higher. However in the case of HIV/AIDS some of the household's respondents were more clearly about HIV/AIDS situation in the last five years while other denied due to stigma. About twelve FHH and four MHH respondents reported on the medically confirmed HIV cases in their houses. In male headed household twelve respondents said that tuberculoses is the major diseases contributing to long illness in their household, while in the case o Diarrhea, diabetes and typhoid's, situation only few respondents report about some of their family members have suffered from these diseases in the last five years. One female respondent was reported about unknown disease which probably related to TB and HIV/AIDS infection. (table 4.2).

**Table 4. 2: Household members suffered from long illness west district Unguja**

Diseases	Frequency		Total
	MHH n=16	FHH n=24	
<b>Malaria</b>	1	21	22
<b>TB</b>	12	13	25
<b>Diarrhea</b>	1	0	1
<b>Typhoid's</b>	2	2	4
<b>Diabetes</b>	1	2	3
<b>HIV/AIDS</b>	4	12	16
<b>Unknown</b>	0	1	1

**Source: Household Survey, 2009**

\*More than one answer could be given by one respondent

#### **4.2.2. Household death in the last five years.**

For the past five years, a total of 35 deaths including 15 males and 20 females were reported in 40 surveyed households. How do you know that these deaths are AIDS related? The relatively higher numbers of deaths from FHH confirm the vulnerability of FHH to number of factors which deteriorate their health conditions. Lack of ability to meet medical expenses and food nutritious insecurity is among the factors that are likely aggravated the situation. Furthermore death in the household reduces labour in agriculture food production interestingly, the results revealed opposite trends of male and female deaths between MHH and FHH. The number of female deaths was smaller in the FHH than the MHH deaths; and the reverse trend was observed in MHH. (table 4.3).

**Table 4. 3: Death in the household in the last five years by gender in west district Unguja**

Type of household	Death in household		
	Number of male died	Number of female died	Total
<b>Male headed household</b>	4	12	16
<b>Female headed household</b>	11	8	19
<b>Total</b>	<b>15</b>	<b>20</b>	<b>35</b>

**Source: Household Survey, 2009**

#### **4.3. Impact on labour**

The study showed that demand of labour in male and female headed household are higher in long rains than short rains. In male headed household the main labour source is household members and hired labour as shown in the table 4.4. While in the case of female household they relied on household members as the source of labour during cropping seasons of short and long rains. In the case of community labour is not important practice to both household interviews in the district (table 4.4). The difference between short and long rains in crop

production is long rains are more reliable rains and most of household members involved in crop production. This has implication of high labour demand during this period, in this case if AIDS affected household face a labour shortage for farm activity led to less land cultivated and as results of food shortage as shown above in conceptual framework (figure 2.1).

**Table 4. 4: Household labour sources for crop production**

Labour sources	Frequency		Frequency	
	MHH n=16		FHH n=24	
	Long rain	Short rain	Long rain	Short rain
Household labour	10	10	20	20
Community labour	0	0	1	1
Hired labour	7	8	5	4

**Source: Household Survey, 2009**

\*More than one answer could be given by one respondent

#### 4.4 Impact on crop production

The study shows that both MHH and FHH prefer cassava and cow peas intercropping. The finding revealed that FHH are mostly involve on food crops like cassava, cowpeas, sweet potato and vegetables. This has implication that, most FHH rely on agriculture for food security, while MHH were also prefer to grow cash crops like coconut and mango. For the case of MHH they prefer to intercrop mixed and row. This finding has implication that most female farmers grow food crops and among the crops cassava and cow peas is considered as a best for food security because there are less labour intensive crops by reducing timely weeding. In the case of the seasonal crops, 17 FHH out of 24 respondents consider maize as the one of the good seasonal crop for intercropping, likewise majority of MHH (10 out of 16) are in agreement with FHH on the suitability of maize for intercropping but not with other food crop but coconut and mango (figure 4.1). Coconut and mango trees mostly are a commercial crop which serves as source of money to meet other household running costs. Majority of male headed household owned coconut trees because of having large piece of land which is required for growing.

Another category of row intercropping which seem to be preferred among women in the study area is that of vegetables. Majority of FHH (figure 4.1) mentioned that intercropping of vegetables like pumpkins, spinach, tomato, onion and amaranthus could improve production per crop. However, most MHH don't prefer vegetable intercropping since they own big land which can be used for cash crops. (figure 4.1). Furthermore, focus on food production to female farmers than male was also noted in intercropping of sweet potatoes and other crops. The finding indicated sweet potatoes are mostly grown by the FHH and the crop can be seldom grown by MHH (figure 4.1).

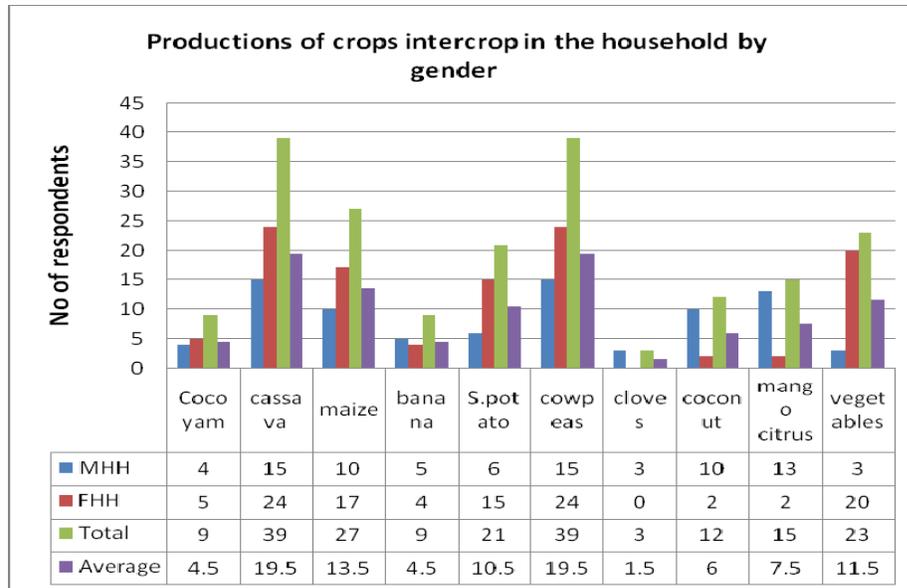


Figure 4. 1: Production of intercrops in the household survey by gender in the west district Unguja  
(Source: Household Survey, 2009)

#### 4.5. Land ownership for crop production in HIV/AIDS affected household in west district

Among 24 female headed household interviewed, most of them revealed that they own one acre of land which they either inherit from their parents or their family members after division of wealth not clear (figure 4.2). While in male headed household majority of them revealed that they own between three to four acres of lands. Few of male have small piece of land compared to female headed household (figure 4.2). This findings has implication that female headed household have limited land for food production taking into account that they have also high number of family members as explained in (figure 4.2) above. Also the labour demand in male headed households is higher due to having large piece of land, however male headed household practicing intercropping also benefit from earning money by selling coconut and hired labour to replace the shortage as mentioned in (table 4.4). Although female headed household have small piece of land but they majority do not have money to hired labour to replace the labour shortage caused by AIDS related illness in the household. Therefore in production of food male headed household have high chance of produce more food for security and selling surplus food for earning money than female headed household. In this case some female headed household who are landless were at the risk situation of being infected with HIV virus. The impact of lack of land led to vulnerable women and children to migrate in town and city and involved in risk livelihood option of infected with HIV virus.

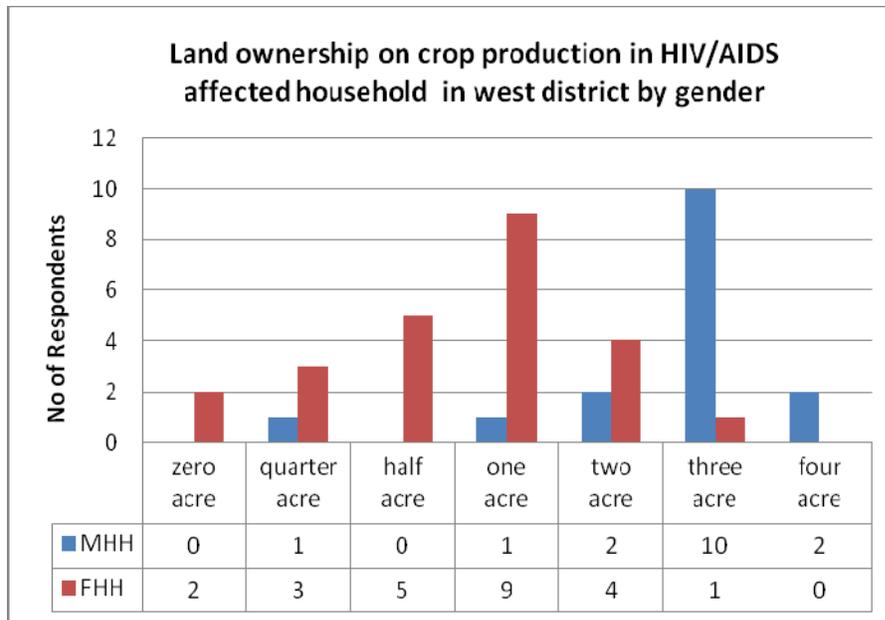


Figure 4. 2: Land ownership in household affected with HIV/AIDS by gender in the west district Unguja.  
(Source: Household Survey, 2009)

#### 4.6. Household source of information on crop intercropping in west district of Zanzibar

The results show that out of 40 respondents only 10 received information from agricultural extension.. In term of radio as source of information for crop intercropping, very few female headed household have access to radio are only three while men respondents are 5 in 24 and 16 respondents respectively. Despite of the government of Zanzibar distributing electrical energy to rural areas, still many household failed to have access of television in their house. The impact of poor information to HIV/AIDS affected household led to inability access of inputs, labour saving technology crops, information on weather, training, access to loan etc.The survey study revealed that few household has television or access to television for agriculture program. But female household only one respondent said that she have access to use television. In both household surveys male and female said that they relied on friends and experience on crop production and intercropping system. Although farmers have good experience in food production but due to the change of environment and agricultural technology, farmers still need help from agriculture extension workers to enable them to produce more in small piece of land despite of environmental changes and removal of agriculture subsidize by the government and donors countries. Many female household farmers report on friend's knowledge on crop production compared to male household surveyed in the last five years. About 20 female respondents are either relied on friends and experience (Table 4.6 ). Insufficient information on agriculture production has influence on crop calendar and labour requirements. Information on early timely planting and weeding can save labour and improve yield.

**Table 4. 5: Household information sources on crop intercropping west district**

Source of information	Frequency		Total
	MHH n=16	FHH n=24	
<b>Agriculture extension worker</b>	7	3	<b>10</b>
<b>Radio</b>	5	3	8
<b>Television</b>	5	1	6
<b>News paper</b>	2	0	2
<b>Friends</b>	5	20	25
<b>Experience</b>	11	9	20

**Source: Household Survey, 2009**

\*More than one answer could be given by one respondent

#### **4.7. Yearly food shortage**

Is this information based on the interviews with the respondents? The survey results revealed that in every year the HIV/AIDS affected house and non affected household were facing food shortage between the months of January to April that is the of heavy rains for long rain seasons. If all households suffer from food shortage, than how can we know the impact of AIDS? In this period of four month January to April most of the farmers spend the reserved food produced during short rain growing seasons. In the figure below shown that female headed household was more affected with food insecurity during this period compared to male headed household. The figure 4.3 shown that in male headed household food shortages are faced during the month of November to February in every year. In the female headed household results shown that out of twelve month half of this was facing food shortage in their house. Normally the food shortage start from December to May in the female household as indicated below (figure 4.3). The reasons behind that in some male household still surviving by selling mangoes, dorian, jack fruits and cloves to replace food shortage by buying from the shops. In the case of female who are not own the fruit trees still rely on food crops where by its production cost are higher with low access of inputs and unreliable rain falls. In generally between the month of month of November to march most of the household in the west district facing food shortage (figure 4.3) What do you want to say by all this information?

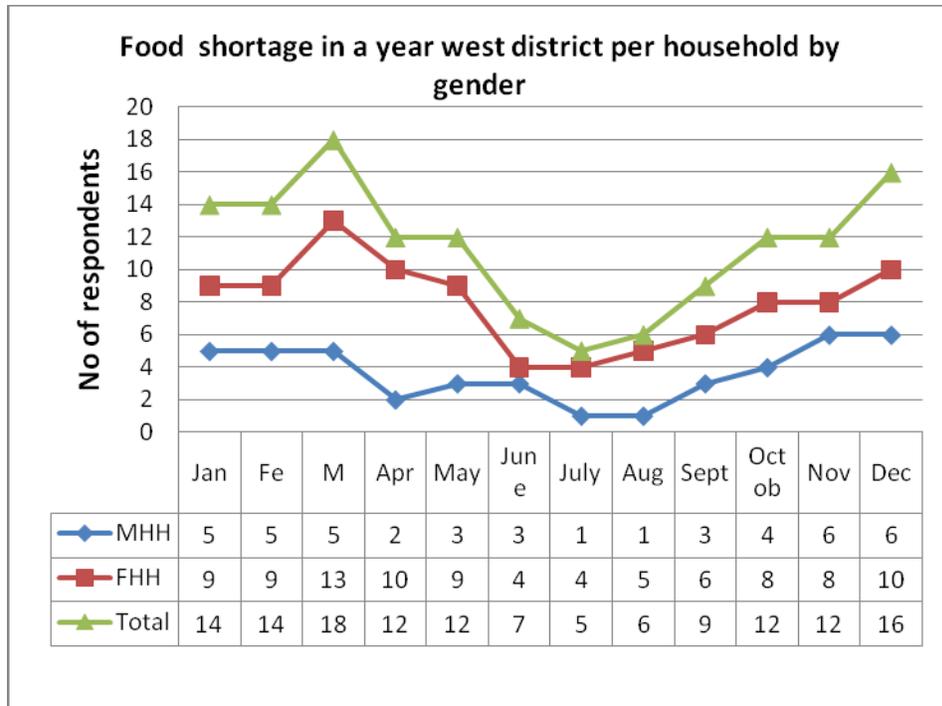


Figure 4. 3: Food shortage during the year in the west district by gender Unguja. (Source: Household Survey, 2009)

#### 4.8. Farmers’ opinion on use of intercropping to mitigate food insecurity

The study finding revealed that, intercropping is a good practice to use mitigates food insecurity to HIV/AIDS affected household. However some respondent added that intercropping despite be a good practice but needs input supplied during growing season (Table 4.6). About 13 respondents said that in order to have successful intercropping the supply of inputs are the most important (table 4.6). In both MHH and FHH mentioned that intercropping is not bad system to use since it has been practice for many years in their farm. This findings has shown that by improving intercropping farming system on HIV/AIDS affected households also will ensure food and nutrition security. As the famers mentioned earlier they are also insisting that intercropping help them to reduce workload (labour saving) in the field when they planting cover crops like cowpeas and sweet potatoes along the rows or between the rows of maize, cassava, banana and yams. The observation also shown that MHH practicing intercrop of cash crops like coconuts, cloves and mango trees where they sale the crops and earning money.

**Table 4.6: Household opinion on intercropping mitigated food insecurity.**

Farmers opinion	frequency		Total
	MHH n=16	FHH n=24	
Very good	1	4	5
Good	9	18	27
fair	5	1	6
Bad	0	0	0
Very bad	0	0	0
Need inputs	3	10	13

**Source: Household Survey, 2009**

\*More than one answer could be given by one respondent

#### 4.9. Reasons of use intercrop on HIV/AIDS affected household

The study showed that most of respondents from both household they are using intercropping farming system because of the following reasons. The first main reason is food security in the household especially during cultivation periods where by many households in rural area in Zanzibar spend most of their time in the field for crop production. About 20 female headed household interviewed respondents mentioned that they practicing intercropping for mitigating food insecurity while in male headed household mentioned 10 out of 16 respondents respectively (table 4.7). Reduce crop failure and labor saving technologies are other factors of practicing intercropping in their farm to mitigate HIV/AIDS. In female headed household 17 out of 24 respondents said that intercropping could mitigate labour in the field when you plant cover crops like cow peas, sweet potatoes and ground nuts planted inter-row or intra row spacing with crops like cassava, maize, banana, and coco yams, while man headed household 9 respondents revealed that intercropping can mitigate food insecurity to HIV/AIDS affected household. The results also shown that in female headed household intercropping is a source of nutrition security is more priority while some man respondents mentioned that intercropping also improves access of market because having more than one crop in the field. Both male and female headed household mentioned that practicing intercropping not because of increasing soil fertility and enhancing plant health, in my observation this farmers has low knowledge of farming system as mentioned by farmers in next table.

**Table 4. 7: Reasons of using intercropping on AIDS affected household**

Reasons for intercrop	Frequency		Total
	MHH n=16	FHH n=24	
Food security	10	20	30
Nutrition security	1	4	5
Reduce crop failure	10	18	28
Good market	4	1	5
Labour saving technology(weeding)	9	17	26
Conserve moisture	3	1	4
Increases soil fertility	3	7	10
Improve plant health	1	2	3

**Source: Household Survey, 2009**

\*More than one answer could be given by one respondent

#### 4.10. The intercropping system for mitigating food insecurity to HIV/AIDS affected household in west district of Zanzibar

The study result showed that about 14 female respondent out of 24 prefer (Very good) to use row intercropping for mitigating food insecurity to HIV/AIDS affected household. In Zanzibar row intercropping is use for planting food crops like maize, ground nuts, cassava, cow peas and vegetables. The case of women living with HIV/AIDS Mrs Machungwa (Box 1 below) insisting that she want to continue practicing row intercrop because is a labour saving technology since she is living with HIV. She added that by planting vegetables where she can sell and eat to improve her healthy status. Other factors forcing women to choose row intercropping are they planting short maturity crops like cow peas and vegetables which normally take 2-3 months from the planting dates to harvesting as mentioned earlier. During interview some women headed household mentioned that they use both intercropping system (Row and Mixed intercrop) because they inherits parents farms with some tree crops like mango, coconut, cloves and citrus, while other mentioned that they were force to live the lands after their husbands died. In case of male headed household to prefer mixed cropping than row or relay intercropping because, In Zanzibar culture many men inherits large piece of land compared to women. The men also focus on cash crops whereby they plant coconut, banana, mangoes and cloves trees as indicated in (figure 4.1). Although man also plant cassava and banana as a cash and food crops. Relay intercrop is not very common in the district but some farmers revealed that they practicing mono crop in the rice field but they are planting cow peas after harvesting of rice to improve soil fertility during the month of July to August every year and most of this farmers are women (table 4.9).

**Table 4. 8: Household best intercropping mitigating HIV/AIDS**

Intercropping system	Frequency							
	MHH				FHH			
	V.good	Good	Fair	Bad	V.good	Good	Fair	Bad
<b>Row intercrop</b>	2	2	12	0	14	9	1	0
<b>Mixed intercrop</b>	11	2	3	0	8	4	8	0
<b>Relay intercrop</b>	0	0	4	0	0	3	0	0

**Source: Household Survey, 2009**

\*More than on answer could be given by one respondent

#### 4.11. Factors contributing to poor crop intercropping on HIV/AIDS affected household in west district Zanzibar.

The study showed that about 20 out of 24 respondents from female headed household have low knowledge on farming intercropping and only 4 did not mentioned, however some of these farmers earlier mentioned that they were involved in IPPM, PADEP and NAEP 2 project. This shown that many households man is the one attending the workshops and training organize by stakeholders of crop production and management, however the experience shown that women are the main target to received due to their interaction with food production in the island.. In men household only 9 respondents report that knowledge is insufficient for practicing intercropping (table 4.9). Also in these results shown that women headed households have insufficient land for crop production and other inputs such as seed, pesticides and fertilizers for crop production (table 4.9). In human diseases the results shown those female headed households are more affected with malaria and tuberculoses of about

10 and 7 household respondents compared to man headed household. Both male and female headed household reported that during surveyed HIV/AIDS and tuberculoses are some of factors which caused poor crop production, however my experience and observation during this study shown that, respondents fear discrimination if they disclose their health status. In the case of inputs such as fertilizers and pesticides, many of respondents in MHH and FHH revealed that, price of inputs as source of poor food production in the district. Bad weather such as unreliable short rains courses food shortage in the district (table 4.9)

**Table 4. 9: Factors contributing to poor crop intercropping to HIV/AIDS affected household in west district**

Factors	Frequency		Total
	MHH n=16	FHH n=24	
Low knowledge	9	20	29
Labour shortage	10	18	28
inadequate of improved seed	7	14	21
Un affordable price of fertilizers	8	18	26
pesticides (expensive)	6	13	19
Limited land	5	20	25
Bad weather	5	13	18
HIV/AIDS,	1	5	6
TB	1	7	8
Malaria	4	10	14

**Source: Household Survey, 2009**

\*More than on answer could be given by one respondent

This chapter has highlighted the impact of AIDS on labour availability, food insecurity, land ownership and intercropping. Dependency ratio is high in female than male headed household, limited land for production and labour shortage in case of family member falls ill. In conclusion of the results showed that practicing intercropping could be use as response to mitigate labour shortage to AIDS affected household and improve food security in the period of low food in the household as shown in (figure, 4.3) and box 1 and 2 below.

**Box 1. A case of intercropping and stigma of Mrs Machungwa.**

Mrs, Machungwa is 36 years old living with two children in a small mud house in Dole village of Unguja Island of Zanzibar. The house is belonging to a friend who has decided to assist the family. Before that Mrs Machungwa and two (sons) children (8 year and 12 years sons) used to stay with her parents after her husband abandoned the family because she disclosed her positive HIV status. The reasons for living alone were that her parents and family members stigmatized her due to her health condition by saying that she must live the family because of her shame. The two children one is deaf and he has dropped out of school and another one is still in primary school because of free primary education program of Zanzibar government. The house she is living now is temporary and not permanent and she has been asked by the owner to find another residence in a short period of time. Mrs Machungwa is involved in campaign against stigma and discrimination to the people living with HIV/AIDS and she attends many forum, seminars, trainings and workshops organized by Zanzibar Aids Commission and ZAPHA+ and NGOs. She is receiving ARVs for free of charge from government clinics. She is encouraging other people in the village to visit the clinic for testing their health and knowing their status so that they can live with hope and confidence. She has no land but her friend temporarily gave her a quarter of an acre to plant vegetables for her nutrition and selling some to earn money and buying food for the children. Since she was given the land she has failed to grow vegetables because of lack of money to buy seeds, fertilizers and hire labour for land preparation, plating and weeding. She explained that her aim is to practice row intercropping farming system by planting vegetables, sweet potatoes and cassava because this is a labour saving technology in terms of weeding and irrigation, she added that intercropping helps people living with HIV/AIDS having a variety of foods and nutrition. See Figure 3. A photo showing row intercropping of banana, sweet potato and Maize at Kidichi village in Unguja Island of Zanzibar

**Source; Household survey, 2009**

**Box 2. A case of intercropping and stigma of Mr Banana**

Mr Banana is 47 years old living at Kizimbani village residential area of Unguja Island of Zanzibar. The village he lives in is much closer to Kizimbani agricultural research Station where farmers' field days, trainings and workshops are conducted. He has five children and three are boys and two girls of age 1, 2, 6, 8, 10 years old, three children are attending school and two are still young to register in primary school. He got the three older children from his late wife Doriani who passed away three years ago due to acute tuberculosis and HIV/AIDS related symptoms. The two young children are from his new wife Mapera. Mr Banana is a farmer practicing intercropping and owns 3 acres of land which he inherited from his father Coconut. He has planted cassava, banana, mangoes, coconut, rice, sweet potatoes and yams. Mr Banana also is a livestock keeper, rearing chickens and goats. Mr Banana refuses to go for HIV and tuberculosis test when his brothers and sisters in-laws advice him to do because of his former wife who was suspected to have died with AIDS related illness. His new wife is from Tanzania mainland as he found it difficult to get a woman in the same village he lived because of gossiping for HIV positive AIDS positive. Mr Banana is experienced in farming and attending many training on intercropping farming system organized by FAO, NAEP and PADEP. He said that practicing intercropping could reduce crop failure, labour saving when you plant cover crops like cowpeas and pumpkins that suppress weeds, ensure food security in the household and reduce cost of inputs like irrigation, fertilizer and pesticides.

**Source: Household survey, 2009**



Figure 4. 4: Row intercropping farming system in west district Unguja  
(Household survey, 2009)

## **Chapter 5. Discussion**

### Introduction

This chapter discusses the findings of chapter four of the study.

### **5.1. Demographic composition**

The finding of the study revealed that, in female headed households, dependency ratio are higher (2:1), two members in the household depend on one female headed household while in male headed household one member depend on one male headed household (1:1). Average household size is higher in female headed household, the average number of members in female headed household are of twice than the male counterpart. This result has the indication that in women headed household have less prime age group to work in crop production. Barnett, Whiteside (2005) revealed that, dependency ratio increase where household comprise of more children and elderly. In this case, dependency ratio has high impact on labour on food production by increasing working hours in the farms.

Furthermore, this chapter describes household labour sources shown that the female headed household depend on household labour for agriculture crop production than male household (table 4.4). Considering the economic condition of the female household head feeding large number of dependents has, not only implication on amount of food required but also the quality of food is likely to be below standard. In return this will be associated with vulnerability of household members to different types of diseases and probably deaths. For instance, the survey results reveal that in the last five years higher numbers of deaths were reported in female headed household than male headed household and thus still increase dependency ratio.

### **5.2. Long illness and death**

The study showed that not only HIV/AIDS is a compounding factor to labour shortage in food security but also malaria and TB are other diseases destroying the life of family members reported in this study, however AIDS was found to increase consequence in the household. There is high malaria and tuberculoses (TB) cases reported in this district surveyed. The implication of other human diseases together has showed to have high impact on agriculture labour, food insecurity and nutrition will result in reducing productivity in agriculture in this district. The study conducted by ILO (2005) revealed that household illness of a family member means the loss of that person work and income increasing medical expenses and the diversion of other family members work or school caring for the patients. Death results in permanent loss of income and often, the removal of children from school to reduce expenditure and increase family labour earning.

### **5.3. Household Labour**

In the case of labour to the HIV/AIDS affected household in west district. The study showed that most of the female headed household use household labour for land preparation, planting, weeding, harvesting and post harvest in both cropping seasons of long and short rain in west district of Unguja island Zanzibar. The implication of this finding showed that if the female household is more at risk of poor production of food if one of the family members falls sick. This situation will lead to reallocation of labour in the household by reducing land for agriculture, dropout of school children or planting less labour demand crops like sorghum

and cassava. In Zanzibar, community labour is not common practice compared to Tanzania mainland where labour exchange is common practice. In male headed households the situation is different to female headed households where by most of them can hire labour in case of labour shortage. A study in the United Republic of Tanzania showed that a woman whose husband was sick was likely to spend 45 percent less time on agriculture than if the husband were healthy (Rugalema, 1999b).

#### **5.4. Crop Production**

The finding of this study showed that, both MHH and FHH prefer to produce cassava and cowpeas intercropping. As mentioned earlier the finding also revealed that FHH are mostly involved in food crops like cassava, cowpeas, sweet potato and vegetables. This has implication that, most FHH rely on agriculture for food security, while MHH also preferred to grow both food (cassava and sweet potato) and cash crops like coconut and mango as mentioned by Mr. Banana in box 2.

#### **5.5. Factors contributing to low crop production.**

Beside impact of HIV/AIDS in food production and security, there are other factors reported in this study contributing to low production which led to food insecurity to HIV/AIDS affected household. The study find that; insufficient knowledge in intercropping, shortage of labour, insufficient inputs such as seeds, fertilizers, pesticides, insufficient land in particular to female headed household and bad weather are also mentioned by respondents in this survey study. The study showed that rural people who are living in west district have suffered from food shortage even before HIV/AIDS epidemic. In this situation HIV/AIDS epidemic exacerbated the food shortage to those HIV/AIDS affected household. Similar results reported in a study conducted in Burkina Faso in 1997, it was found that in two villages, Sanguié and Boukhiemdé, shifting work patterns and an overall reduction in food production had occurred as a result of the HIV/AIDS epidemic.

In response to the production of crops in intercropping, the findings showed that Cassava, cowpeas, maize, sweet potato and vegetables produced high yield for both affected HIV/AIDS male and female headed household. In chapter four table (4.11), respondents adding that in order to produce more yields to HIV/AIDS affected household provision of agricultural inputs are necessary to farmers in this district surveyed. The implication of this finding to people living with HIV/AIDS in response to food and nutrition are shown will improve if the knowledge of intercropping and inputs will be supplied to HHIV infected household before and after growing seasons. The crops like cassava, cowpeas, and sweet potatoes, maize and vegetable could improve the health status of HIV infected person and also reduces the rate of malnutrition.

Chandra, (1997) revealed that the difficulty with food production to HIV infected person is a result of poor nutrition in terms of protein and energy. Also due to malnutrition and deficiencies in micronutrients such as iron, zinc and vitamins which easily can produce through intercropping system of cassava, cowpeas, sweet potato, maize and banana as mentioned in previous findings. The study showed that all households surveyed explained that no food aid was received during growing seasons in the last decade neither from Government nor from private sector, international institution (FAO, WFP, IFAD or UNDP) and NGOs operating in Zanzibar.

In the case of food shortage to HIV/AIDS affected household interviewed. The study showed that there is food shortage in some years in west district of Unguja island of Zanzibar. The findings showed that food shortage to affected HIV/AIDS household beginning from October to April in every year, however in female headed household the situation is severe and could accelerate death of individual affected with HIV because of improper nutrition. This finding shows that immediate response on food aid and supply is required during the time of food shortage. In assumption show that people could migrate to other places to look other risk livelihood options in particular women who can exchange food for sex.

A study by Muller R Tanja, (2005) revealed that, the relationship between HIV/AIDS and food security is multidimensional. On the one hand, food insecurity is believed to biologically increase the risk of HIV infection, with malnutrition increasing the risk of transmission of the virus. The assumption and implication of this findings revealed that women headed households are more at risk of being infected with HIV/AIDS during growing seasons when the food in their households is insufficient. Because as compared to male headed households, female headed households suffered more in terms of food shortage in a year and they might exchange sex to food in order to feed their family. Similar results revealed by Muller T R, 2005 920050, that food insecurity may force individuals to adopt livelihood strategies that lead to greater susceptibility to HIV infection.

## **5.6. Land ownership**

In the case of land ownership in the west district of Zanzibar, results showed that, Male headed household own larger pieces of land. Land ownership favors more to men than woman when their father died. This is due to Religion (Muslim Law) and also customary law which existing and still use by Christians and Hindus living in Zanzibar (My observation). It is estimated that man can inherit 80% of wealthy of her father including land or farms (Mr Juma explained). The study conducted in Northern Province of Zambia reported that in fishing and agriculture communities, female-headed households, particularly those taking care of PLWA, have significantly smaller areas of agricultural land than male-headed ones.

Access to land is through chiefs, who are assisted by headmen and village committees that process requests and allocate the pieces of land required. Inhabitants usually inherit land through their family lineage, which can be under either the patrilocal or the matrilineal system (FAO, 2004). In the chapter four figure 2 showed the trend of land ownership between male and female HIV/AIDS affected households in west district. The implication of this findings is that, male headed household affected with HIV/AIDS have higher chance of practicing different types of intercropping, since the lands they inherited from the father comprises fruit trees which can help to sale and earn money which they can use to buy more land for agriculture production.

## **5.7. Agriculture information**

This study investigated the sources of agricultural information available to HIV/AIDS affected households who are practicing intercropping farming system in west district as well as the farmers' preferred sources. The study showed that many of the HIV/AIDS affected households rely on friends or farming experience from their ancestors in intercropping farming activities. However some of the interviewed said that they get information through radio, television and news papers. This finding has implication of slow delivery of new agriculture information technology to HIV/AIDS affected household on farming intercropping, inputs supply and agriculture market in general. Venkatesan (1995) notes that the mass

media are particularly effective in making farmers aware of new technologies and thereafter they can always approach the extension agent, whose job is to deliver repackaged agricultural information from subject matter specialists to farmers for application in their farming operations. The implication of this findings emphasize the need for the extension agency to regularly identify those sources of information that affected HIV/AIDS farmers prefer, or use most, as this will enable them deliver agricultural information effectively to the farmers. Agriculture information is important in planning of farm activity that will help to reallocate labour time for weeding and sowing.

### **5.8. Production seasons**

As mentioned earlier, Zanzibar has two cropping seasons which start from March to June for long rain and September to November for short rain. The experience shown that farmers put more efforts to planting crop during long rain because is reliable (My experience and field observation). In this research the findings revealed that short rain in west district of Zanzibar produce low yield. Similar results were reported by PPD (2005) on Agriculture farming system in Tumbatu Island in Zanzibar. Zanzibar agriculture food production mainly relies on rains and this makes production vulnerable to adverse rainfall patterns especially to small scale poor farmers living in the rural areas.

### **5.9. Importance of intercropping on mitigating labour and food security.**

In the survey study shown that most of the respondents agreed on intercropping could save labor, ensure food security and reduce crop failure in the field. This result is similar and supported by the study conducted by Andrews and Kassam. 1976, PPD, 2006, their findings shown that intercropping farming system ensure food security all year round, replenish soil fertility and reduce cost of fertilizers and labour, control weeds, pest and diseases of the plant, improve nutrition status and conserve moisture in the soil.

As the earlier results from the table 4.7 above of opinion of HIV/AIDS affected household on intercropping. The results of the study shown that both female and male headed household interviewed agreed on intercropping is a good farming practice on mitigating food insecurity to HIV/AIDS affected household. However, in order to achieve best intercropping for better yield and food security, both male and female household mentioned about supply of agriculture inputs to HIV/AIDS affected household.

A study by "Feldstein & Poats, (1990) reported that Intercropping beans and maize in the same row led to an increase in bean yields in Zambia". K.G Steiner, GTZ & J. Kienzle, Fatima Ribeiro (2004) "revealed that, mitigating the impact of HIV/AIDS requires different strategies". An important one is the offer of labour saving technologies in food production and domestic work. This strategy has the advantage that it can discharge women, overburdened with work, taking care of the sick, producing food, collecting fire wood and fetching water.

### **5.10. Type of intercrops**

The study showed that row and mixed intercropping is used as response on food insecurity by planting fruit trees like mango, citrus, cloves and coconut in the same piece of land intercrop with food crops like cassava, cowpeas, yams, maize or sweet potato. The study results showed that there are different opinions between male and female headed households interviewed. The differences are caused by land ownership between these household categories. Normally mixed intercropping needs a large piece of land to plant tree

and food crops. The tree crops like mango and coconuts required large spacing between plants to plant in order to produce high yield. The male headed household revealed that mixed intercropping is the best practice of mitigating HIV to affected household. The implication of this finding showed that the HIV/AIDS affected household required knowledge, inputs and training with respect to existing system of intercrop they use as the best coping strategy in mitigating HIV/AIDS.

## **Chapter 6. Conclusion and Recommendation**

This chapter draws conclusion from the research findings after the discussion of the findings of previous chapter five. The proposed recommendations are based on conclusion and findings that will suggest the way forward to the problems studied. The recommendation will be short term and long term program.

### **6.1. Conclusion**

Based on the main research question and sub questions above and reflect to the study findings. It can be concluded that intercropping mitigate impact of AIDS on food security for HIV/AIDS affected household in the district surveyed. This is due to awareness of respondents about intercropping on labour saving time, reduce crop failure and improve production. The opinions results about intercropping on mitigating AIDS in rural areas are supporting this conclusion and as a good indicator.

Secondly, it can be concluded that AIDS does impact on food security. A demographic composition shown that, female headed households have higher dependency ratio than male counterparts as mentioned earlier and has implication on labour shortage. A female living with HIV Mrs machungwa is an evidence of impact on food security. She has been abandoned by her husband and parents because she disclosed her status. In depth, she is landless and do not have access to food production due to lack of money to buy agriculture inputs.

Thirdly it can be concluded that, despite of lack of inputs on crop production but the farmer's opinion as an indicator of Row and Mixed intercropping can contribute to food security to AIDS affected household. In support of this statement, the two cases above revealed that row and mixed intercropping can contribute to food security.

Fourth conclusion with respect to findings has shown that, crops like cassava, maize, cowpeas, vegetables, sweet potatoes, mango/citrus and coconut produce high yield/production when they are intercropped with other crops. This is further resulting remove the household shock due to AIDS impact on household.

Five it can be concluded that, row intercropping respond best in terms of labour shortage. Both female and male headed household supporting this statement as showed earlier (table 4.9)

In the case of land ownership, it can be concluded that, MHH owned large piece of land than female headed household. The results showed the big gap between two household on land issue. This situation FHH have less chance of mitigating food insecurity in their households.

Stigma and discrimination against people living with HIV and AIDS still exist in the districts. Some respondent's refuses to answered the question due to fear and shy of being victimized by village society if they disclosed their health status (refer Box 1 the case of Mrs. Machungwa).

Therefore, it can be concluded that, intercropping is a good farming practice to use on mitigating, labour shortage, crop failure and ensure food security to AIDS affected household.

## 6.2. Recommendations

There is immediate need to assist female headed household living with orphans in education. It is strongly recommend that the district planning office together with Ministry of education of Zanzibar to support these orphans by providing school materials and exempted from paying school fees which believe hindered the affected HIV/AIDS poor families in the district surveyed.

Special attention should be put in Malaria and Tuberculoses. I call upon the ministry of health and community to work together on prevention and treatment on these two killer diseases. One option is public campaign on testing malaria and tuberculoses when any members of the village fall sick. Also campaign on HIV/AIDS counseling and testing should continue, the HIV infected person can live longer if he/she do not suffered from other diseases which reduced immune system.

Another important issue is about land policy. Special attention should be given to land ownership in agriculture production. The division of land should be based on needs of household in mitigating HIV/AIDS through use of intercropping system. Zanzibar land policy should be reviewed by involving all stakeholders, government, community, tribal leaders and religious organization. In the study showed that female headed household have small piece of land and some even landless that make difficulty to respond on impact of AIDS on food production.

In order to ensure the sustainability of intercropping on HIV/AIDS affected household, the recommendation is for agriculture extension workers to get training on how they can transfer new farming system on intercropping to HIV/AIDS affected household. Also the agriculture subsidize should be provided to AIDS affected family in the district when it's necessary.

In case of labour shortage in intercropping, there is a need to sensitize community labour exchange as a coping strategy in response to labour during land preparation, sowing, weeding, harvesting and post harvesting. This would assist those families that have less labour to compensate the loss of labour due to care or nurse the AIDS infected person. Also awareness campaign should continue against discrimination and stigma to HIV infected household and individual person.

In order to improve food security situation for rural families affected with HIV/AIDS and to help sustain food production and their income base. The agricultural international institutions such as FAO and IFAD and national decision makers like ministries of Agriculture, Land and NGOs working in this field, need to broaden the knowledge of the coping strategies already being exercised by the HIV/AIDS affected families and communities themselves,

## References

Andrews, D.J., A.H. Kassam. (1976). The importance of multiple cropping in increasing world food supplies. pp. 1-10 in R.I. Papendick, A. Sanchez, G.B. Triplett (Eds.), *Multiple Cropping*. ASA Special Publication 27. American Society of Agronomy, Madison, WI.  
<http://www.answers.com/topic/intercropping> (Accessed 2009)

ASP, (2002). Agricultural Sector Policy. The Ministry of Agriculture, Natural resources, Environment and Cooperative. Revolutionary Government of Zanzibar-Tanzania

Barnett, T. and Whiteside, A. (2007). AIDS in the Twenty-First Century, *Disease and Globalization*, Second Edition

Barnett, Tony, and R. Grellier (2003) 'Mitigation of the Impact of HIV/AIDS on Rural Livelihoods through Low-labour Input Agriculture and Related Activities', report, Norwich: Overseas Development Group, University of East Anglia.

Barnett T and Whiteside, A. (2006) AIDS in the twenty-first century. Diseases and globalization. Palgrave Macmillan

Black-Michaud, (1997). The Impact of the HIV/AIDS epidemic on agriculture in west Africa. Rome: FAO. [www.un.org/esa/population/publications](http://www.un.org/esa/population/publications). (Accessed, 2009).

Chandra, R.K (1997). Nutrition and the immune system: An introduction. American journal of Clinical nutrition 66: 460S-463S

DHS, (2005), District Household Survey, Zanzibar.

FAO, (2007). The effects of HIV/AIDS on agriculture: an A to Z. The impact of HIV/AIDS on Agriculture: Focus on Gwanda, Uganda. (Accessed, 2009 Wageningen)

FAO (2004). HIV/AIDS, Gender Inequality and Rural Livelihood; The impacts of HIV/AIDS on rural livelihood in Northern Province Zambia pp 2-4,54-56

FAO, (2003). HIV/AIDS and agriculture: impacts and responses. Case studies from Namibia, Uganda and Zambia pp 2-24.

FAO/OXFAM-GB, (2003). Report of Workshop on Women's Land Rights in Southern and Eastern Africa. Cited in FAO and UNAIDS 2003. Accessed Wageningen Library, 2009)

FAO, (2002). HIV/AIDS, food security and rural livelihood: Facts sheet.

Feldstein. H and Poats. S, (1990). Rural households and resources .A pocket guide for extension workers .SEAGA.

Gillespie Stuart (2008). Poverty, Food Insecurity, HIV Vulnerability and the Impacts of AIDS in sub-Saharan Africa. Journal of Institute of Development Studies (IDS). [www.jlica.org/us](http://www.jlica.org/us) (Accessed, 2009)

ILO, (2005). Global programme on HIV/AIDS and the World Bank

Joel K. Ranslem (1990). Wee control in maize and legume intercrop. Proceedings workshop on research methods for cereal/legumes intercropping in eastern and southern Africa. Maize Agronomist. CIMMTY Nairobi. Kenya. Held in Malawi 23-27 1989.

Juma A. Juma and Saleh H. Haji. (2008). Food Vulnerability Assessment in North "A" District, Unguja. The ministry of Agriculture Livestock and Environment. Zanzibar.

Kwaramba, P. (1998). The Socio-economic Impact of HIV/AIDS on Communal Agricultural Production Systems in Zimbabwe, Working Paper No 19. Harare: Economic Advisory Project, Friedrich Ebert Stiftung.

MALE, (2007). The Budget speech of the Ministry of Agriculture, Livestock and Environment to the members of House of Representatives. Zanzibar.

MoHSW, (2006a). Ministry of Health and Social Welfare. Antenatal Clinic Surveillance Report Number 3. Zanzibar AIDS Control Programme (ZACP). Zanzibar.

Mutangadura, G. (2000) Household Welfare Impacts of Mortality of Adult Females in Zimbabwe: Implications for Policy and Program Development, paper presented at the AIDS and Economics Symposium. Cited in HPG research reports (Accessed, Wageningen, 2009)

Muller T.R (2005). HI/AIDS and Human development in sub –Saharan Africa. Impact mitigation through Agricultural interventions. Wageningen Academic Publisher, AWLAE series No 3. The Netherlands

Mutangadura, G; Jackson, H & Mukurazita, D, (eds) (1999) *AIDS and African Smallholder Agriculture*, Southern African AIDS Information Dissemination Service (SAFAIDS), Harare. (Accessed 2009 Wageningen)

Nicholas, Suite, (2006). HIV/AIDS, Gender, and Household Food Security: The Rural Dimension. Interagency coalition on AIDS and Development. Cited in Agriculture: An anchor for household food security in rural (Accessed 2009 in [www.icad-cisd.com](http://www.icad-cisd.com))

Paul Harvey, (2004). HIV/AIDS and humanitarian action. HPG research report. Humanitarian Policy Group at ODI. London UK. pp 1-40 (Access, 2009).

PPD, (2006). Plant Protection Division of Zanzibar. Report on Farmers Field Schools on IPPM activities. Local report of Plant protection division.

Rachel. S and Steve W. (2005). Responding to HIV/AIDS in agriculture and related activities. Natural Resource perspectives. No. 98. ODI UK.

Ray Bruno Agong. (2008). Impacts of HIV/AIDS on Participation of HIV/AIDS Affected Households in Group Labour Exchange Activities. The Case of Uganda Oil Seed Producers and Processors' Association (UOSPA). Masters thesis, van Hall Larenstein, The Netherlands

Rugalema, G (1999a) 'Coping or struggling? A journey into the impact of HIV/AIDS on rural livelihood in Southern Africa', unpublished paper. (Accessed 2009 Wageningen)

Shapouri, S and Rosen, S. (2001). The impact of AIDS. United Nations Department of Economic and Social Affairs/Population Division. (Accessed 2009 ) in [www.un.org/esa/population/AIDSimpact](http://www.un.org/esa/population/AIDSimpact)

Steinberg, M., S. Johnson, G. Schierhout, D. Ndegwa, K. Hall, B. Russell and J. Morgan (2002). Hitting Home. How Households cope with the impact of the HIV/AIDS Epidemic. A survey of Households affected by HIV/AIDS in South Africa. Washington DC: The Henry Kaiser Family Foundation. Cited in Muller T R, 2005 2005.

Steiner K.G., GTZ & Kienzle, J., Fatima, R. (2004). Mitigating the impact of HIV/AIDS by labour saving technologies. African conservation tillage network (ACT). Information series No 9. (Accessed, 2009)

Topouzis, D. (1998). The implications of HIV/AIDS for Rural development Policy and Programming: Focus on sub-Saharan Africa. Rome: FAO and UNDP.

UNAIDS, (2008). Uniting the world against AIDS. Report on the global AIDS epidemic. International AIDS Conference held in Mexico City August 2008

Venkatesan, Venkatachalam. (1995). The World Bank's experience with T & V in Africa: issues for the future agricultural extension in Africa. Proceedings of an International Workshop, Yaoundé, Cameroon, Jan. 1994. The Netherlands: Technical Centre for Agriculture and Rural Cooperation

ZAC, (2006). Zanzibar AIDS Commission. Zanzibar National Multisectoral HIV Monitoring and Evaluation System: Guidelines for Zanzibar's HIV and AIDS Programme Monitoring System (ZHAPMoS). Zanzibar AIDS Commission

ZAC, (2007). Revolutionary Government of Zanzibar. Joint review of the national HIV Response in Zanzibar.

ZACP, (2003). Zanzibar AIDS Control Programme. Community based HIV magnitude validation survey 2003. Ministry of Health, Zanzibar.

ZFSNP, (2008). Zanzibar Food Security and Nutrition Programme. Revolutionary Government of Zanzibar

ZFSNSA, (2006). Revolutionary Government of Zanzibar. Zanzibar Food security and Nutrition Situational Analysis. Ministry of Agriculture Livestock and Environment. Zanzibar

#### Web sites

FAO HIV/AIDS and Food Security: <http://www.fao.org/hiv aids>.

**Annex**

**SURVEY QUESTIONNAIRE FOR HI/AIDS AFFECTED HOUSEHOLD PRACTING INTERCROPPING IN WEST DISTRICT OF ZANZIBAR**

Surveyor's Name..... Survey Date \_\_\_\_ / \_\_\_\_

N°File

Village.....District.....

Name of farmer..... (Option). Age..... (Option)

Head of the household: Male  Female

Type of household due to HIV/AIDS.....

Marital status.....Sex: Male  Female

Occupation.....

1.) Family members in the household

Age	Male No	Female No	Total
<14			
15-60			
>60			
Total			

2.) a. Are any family member suffered from long illness in last five years? Yes or No

b. How many?.....

If yes, which diseases: (Tick any the appropriate)

Malaria,

TB,

Malnutrition

Cholera

Diarrhea

Typhoid's,

Diabetes

HIV/AIDS

Others.....

3. ) Death in the household in the last 5 years

Age	Male No	Female No	Total
<14			
15-60			
>60			
Total			

4. ) Number of orphan in household.

Sex	No of orphans		No of orphans going to school		Orphans dropout from school		Total
	boys	girls	boys	girls	boys	girls	
FHH							
MHH							
Total							

5. ) Number of family member's economic active.

Household category	Sex		Total
	Number of Male	Number of female	
MHH			
FHH			
Total			

6. ) What is the source labour for farming in your household in cropping seasons? (Tick the appropriate)

Farming labour	MHH		FHH	
	Short rain	Long rain	Short rain	Long rain
Household				
Community				
Hired				

7. ) Combination of type of crops grown per household use for production (Tick any the block√)

Crops planted	√ tick any
cassava	
Maize	
sorghum	
banana	
cowpeas	
Coco yams	
Sweet potato	
Ananas	
Vegetables	
Pigeon peas	
pawpaw	
pampkins	
Mango/citrus	
coconut	
Cloves	

8. ) What acreage of land your household own for intercropping food production?.....

9. ) Cropping season

a. What cropping season produces low food production?

Long rain

Short rain

10. ) Where do you get information about faring intercropping? (Tick the appropriate√)

Extension worker

Radio

News paper

Friends

Others.....

11. ) Which months do you experience shortage of food in your household? (Tick any the appropriate√)

Month	JA	FB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCTB	NOV	DEC

12. What is your opinion for using intercropping to mitigate HIV/AIDS food security to affected household? (Tick the appropriate✓)

- V.Good
- Good
- Fair
- Bad
- V.bad
- Others.....

13.) Why do you use intercrop? (Please tick any appropriate)

Food security,  Nutrition security , reduce crop failure (risk , , mark , Labour saving technology (weeding)  , Conserve moistur , improve plant health  , other.....

14.) What Intercropping farming system produce best results during cropping season? (Tick the appropriate)

Intercropping system	Opinion			
	V.good	Good	Fair	Bad
Row intercrop				
Mixed intercrop				
Relay intercrop				

15.) What factors contributing to poor (Intercropping) food production in your farm in the last 5 years? (Tick appropriate )

- i) Lack of knowledge in intercropping
- ii) Bad weather (rainfall, drought)
- iii) Labour shortage
- iv) Lack of inputs (fertilizers, seeds, pesticides, herbicides)
- v) Lack of land for cultivation
- vi) Pest and diseases
- vii) Soil fertility
- viii) Human diseases (Malaria, TB, HIV/AIDS, Cholera etc)
- ix) Any other factors.....

**Thank you for your good cooperation**