University of Alberta

Impacts of Highly Active Antiretroviral Treatment on Perceived Well-being of Rural Households in Uganda

by

Martha Mweneni Hangula   ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of

Master of Science

in

Agricultural and Resources Economics

Department of Rural Economy

Edmonton, Alberta

Fall 2008

DEDICATION

This thesis is dedicated to my son, and in loving memory of my late mom, Monika.

ABSTRACT

This thesis investigates the perceptions and determinants of change on well-being of rural households after initiation of highly active antiretroviral treatment by HIV/AIDS patients. Determinants of well-being are investigated to highlight the potential variables for well-being improvement and ability to design donor programmes. The study uses two linked secondary data sets containing both objective and subjective household data for a sample of 67 HIV/AIDS households in Uganda, Kabarole district.

This study investigated the impact of HAART on rural household well-being. Study results indicate respondents' perceptions of changes in subjective well-being. This study provides evidence that people's well-being is improving and that the measures of subjective well-being have different determinants. Estimation results suggest that being employed, net savings and social organizational membership have considerably impacts on changes in living standard and happiness of treatment partner and patients respectively. These findings give a better insight of how rural Ugandan households' well-being has changed in response to HAART treatment and also suggest that social capital plays a role in changes in happiness. These results may improve the ability of policy makers to design donor programmes.

ACKNOWLEDGEMENT

Table of Contents

List of Tables

List of Figures

List of Abbreviations

AIDS -   Acquired immune deficiency syndrome

ARVs -   Antiretroviral drugs

CD4 -   Cluster of differentiation 4

GDP -   Gross domestic product

HAART -   Highly active antiretroviral treatment

HIV -   Human immune deficiency virus

IRIN -   Integrated regional information network

OECD -   Organization for economic co-operation and development

UBOS -   Uganda Bureau of Statistics

UNAIDS –   Joint United Nations Programme on HIV/AIDS

1. INTRODUCTION

1.1 Background

HIV/AIDS is a critical challenge to development in Africa. Although HIV/AIDS affects every part of the world, it is in Africa where the effects of the disease are most severe. About 70% of all people living with HIV are in sub-Sahara Africa (UNAIDS 2007). More than 28 million Africans have died of HIV/AIDS since the first case was reported in 1981, leaving approximately 12 million children orphaned (UNAIDS 2006).

To date, HIV/AIDS has no cure and is continuing to spread. The epidemic has caused morbidity and mortality that has affected Africa's economic and developmental progress. Since HIV/AIDS affects people who are also the primary breadwinners within households, the socio-economic impact can be very large (Topouzis and du Guerny 1999, Rungalema 1999). HIV/AIDS is not just a medical problem, but affects every aspect of individuals' lives (Singh 2002, Coutinho 2004)

In response to the HIV/AIDS crisis, highly active antiretroviral treatment (HAART)[1] has been introduced and has become increasingly available since 1996 in many parts of the world. HAART is a specific therapy that is used to control viral replication in the management of HIV/AIDS patients (Tirelli and Bernardi 2001). Although HAART does not cure AIDS, there is evidence that it is highly effective in reducing deaths in developing countries (Laurent *et al* 2002, Marines *et al* 2003, Koening *et al* 2004, Wools-Kaloustian *et al* 2005). According to Strauss and Thomas (1998), these

---

[1] In this study the terms HAART and ARV therapy are used interchangeably to refer to Highly Active Antiretroviral Therapy, which was introduced in 1996.

health impacts could results in improved socio-economic outcomes, especially in resource poor settings.

Although HIV/AIDS has received much attention by researchers over the last 20 years, there is very little knowledge about the impact of HAART on household livelihoods. Though studies on HAART generally focus on medical outcomes, little is known about the broader livelihood implications of improved health that generally accompanies HAART.

1.2 Purpose and Objectives of the study

The main purpose of this study is to examine the impact of HAART treatment on livelihoods of rural households in Kabarole district, Uganda. Our specific objectives of the study are as follows:

- To assess how the subjective wellbeing of rural households has changed in response to HAART in Kabarole district, Uganda.

- To investigate determinants that cause measures of subjective well-being to vary between households.

It is hoped that the results that comes out of this study will provide valuable information to economists, policy makers and health professionals regarding returns to social investments in HIV/AIDS treatments. Moreover, understanding determinants of well-being may improve our ability to design donor programmes.

1.3 Outline of the thesis

The rest of this thesis is organized as follows. Chapter two provides background information to the study and study site. An overview of the country, Uganda, is presented and a description of the larger project, within which this study is situated, is provided. Some general characteristics of the study site are described. This chapter also provides a description of the types of data used in the study and the methods used in collecting such data.

Chapter three presents the review of related literature. I begin with information on household livelihoods in the context of HIV/AIDS. Specifically, I consider approaches that measure these livelihoods. An important component of such studies is understanding how households use available labour resources. Literature review on family care-giving for HIV/AIDS patients in Africa is also presented since this study use some of the data on the perceptions of treatment partners of changes in well-being after initiation of HAART treatment by HIV/AIDS patients. The final section reviews literature of subjective well-being measures, because I use data collected on subjective measure of well-being and this is what I try to investigate in this study. Specifically, I review literature on the determinants of subjective well-being measures.

Chapter four presents the methods used to analyzing the data and the empirical models are formally expressed. Specifically, the theoretical model used in estimating econometric models is presented. Definitions of both dependent and explanatory variables used in the models are presented and the hypotheses are discussed.

3

Chapter five presents both descriptive statistics and results of the econometric analyses.

Finally, chapter six provides a results summary and the final conclusions. In addition, policy implications, limitations of the study and some suggestions for further research are discussed.

2. STUDY SITE AND DATA COLLECTION

2.1 Introduction

This chapter presents general information about Uganda as a whole. An overview of the larger research project within which this study falls is also discussed. The chapter also provides details regarding the study area and a description of data collection methods.

2.2 Overview of Uganda and its HIV/AIDS problems

Uganda is a small, landlocked country, located in East Africa and covering about 236,000 square kilometers. The country lies on the equator and has varying climatic conditions characterized by warm weather in lowland areas and chilly climate in higher land areas (see Appendix A – map of Uganda). The average temperature is 26 Degree Celsius with maximums of 18-35 and minimums of 8-23 degrees depending on the part of the country. Uganda is a tropical country that is generally rainy with two dry seasons from December to February and from June to August (Nkurunungi *et al* 2004).

According to the 2002 Uganda Population and Housing Census, Uganda had a population of 24.4 million, with an average annual growth rate of 3.3 percent and adult literacy rate is estimated at 68 % (Uganda Bureau of Statistics 2002). GDP was about 900 US dollars per capita. About 80% of the population lives in rural areas and the population is comprised of a number of tribes with the largest being Baganda, Banyankore, Basaga and the Bakiga (Uganda Bureau of Statistics 2002). The tribal languages are divided into

5

five broader local languages although dialects may be present within each language. The most spoken languages are Swahili and Luganda, however English is the official language (Mpuga 2003). According to Uganda Bureau of Statistics (2002), most Ugandans are Christian. Specifically, about 41.9% are Catholic, 39.5 % Anglican and 12.1% Muslim.

Uganda was one of the first sub-Saharan countries affected by HIV/AIDS. The country's first cases of HIV/AIDS were detected in Rakai district in 1982. Since then, HIV/AIDS has increased significantly during the early 1990s where the adult prevalence rate went up to 15 percent and eventually declined to 6.4 percent by the end of 2005 (United Nations Programme on HIV/AIDS 2006). This reduction was brought about by using a multi-sectoral approach that involved both commitment from the government, non-governmental organizations, community organizations and individuals. The specific strategy used was the "ABC" approach that focused on promoting behavioral change, particularly, "A"- advocating for abstinence from sex before marriage, "B" - being faithful to one partner and "C" - the use of condoms for those who can't abstain from sexual activities. Sex education has been done in school and through the radio and the government distributed condoms for free, while condoms were sold at a subsidized price. Despite the drop in infection rates, there is now evidence that HIV/AIDS in Uganda is starting to rise again, suggesting it is time to come up with new strategies to prevent increasing HIV/AIDS infections. The Annual Health Sector Performance Report (2007), Uganda, has indicated that there has been an increase in new infections of about 120,000 people in total during the financial year 2006/2007.

One policy response that the government of Uganda has taken is to provide

HAART treatment to HIV/AIDS patients. The treatment provides renewed hope to AIDS

patients to live a health and longer life. As of 2007, of the estimated 250,000 AIDS

patients who need treatment, only about 80,000 patients have access to treatment (IRIN

2008). Moreover, a recent study in Uganda suggested that the availability of HAART

treatment services may not be restraining. Instead, many people are afraid of knowing

their status because of fear of being stigmazed, and lack of effective transportation or cost

of transport as barriers to access treatment (Manosuthi *et al* 2006).

2.3 The Larger Research Project

This study is part of a community-based antiretroviral treatment pilot project that

focuses on a community-based HAART intervention. The community based treatment is

situated in a rural community health center clinic, Rwimi Health centre. The treatment

intervention is centered more on nurses, clinical officers and less on physicians than

traditional urban-based approach. The physicians are, however, responsible for initiating

HAART, and attending to patients' follow-up visits at six months and after one year of

HAART treatment. During these follow-up visits, patients CD4 counts and viral load are

measured. This community based ARV treatment intervention also involves the use of

community health volunteers and treatment partners. Community health volunteers are

given bicycles and are responsible for making weekly visits to patients at their home.

During their visits, volunteers deliver ARV drugs to patients, monitor adverse reactions

to ARV drugs, count the pills required for the assessment of treatment adherence; and

provide condoms to avoid the spread of HIV. For this project each HAART patient is associated with a treatment partner. The treatment partner is a person associated with each HAART patient in the study, typically selected by the patient, to monitor medication intake by patients.

The study involves observation of two separate treatment regimes: the urban (hospital) based ARV treatment and the rural (community) based ARV treatment. Hospital based ARV treatment does not involve community health volunteers. Patients in the hospital based treatment follow the standard procedure of the hospital, where they are required to collect their ARVs prescription from the hospital themselves.

The project involves professionals from various disciplines: economists, medical specialists and sociologists and therefore focuses on the impact of HAART treatment on various aspects of livelihoods. Moreover, specific research objectives of the larger research project are as follows:

- To provide ARV treatment to rural AIDS patient who would otherwise have no access to ARV services.

- To compare treatment outcome of community based ARV with treatment of best practice hospital in Kabarole district.

- To determine cost effectiveness of both community based ARV treatment and hospital based ARV treatment

- To assess the effectiveness of community based HAART intervention as measured by changes in clinical, quality of life and socio-economic status outcome and,

- To evaluate how successful HAART influences the quality of life of AIDS patients and their family members.

2.4 The study Area: Kabarole District

2.4.1   Location and Population

The study was carried out in Kabarole district, Western Uganda (*Appendix B – Kabarole distric map*). According to the 2002 Population and Housing Census, the district had a population of approximately 383,000 people and an annual population growth of 1.5 percent with a total fertility rate of 7 children per family. The majority of the population (88.5%) in the district lives in the rural area (Uganda Bureau of Statistics, 2002).

The district has a total area of 1,814 square kilometers of which 1,569 square kilometers is covered by land (Uganda Communication Commission 2003). Kabarole district is divided into two counties (Burahya and Bunyangabu), one municipality at Fort Portal and eleven sub counties. Fort Portal is the administrative center of Kabarole district. The district has a diverse ethnic background, but the dominant ethnic group in the area is the Batooro population.

2.4.2 Weather and climate

Kabarole district receives about 1,200 mm rainfall annually and has a mean temperature ranging between 22 and 25 degree Celsius. This favors the cultivation of crops that are grown in the area such as tea, coffee, bananas, maize and horticultural crops.

2.4.3 Socio-economic aspects

The majority of the population who lives in rural area depends on subsistence farming, mainly on crop farming and livestock rearing for their livelihoods. Moreover, tea plantations are the major industry in the district. The major subsistence food crops grown in the district include maize, potatoes, cassava, soy beans, groundnuts, sunflower, yams, cooking bananas, cabbage and tomatoes. Livestock is the second economic activity to crop production, mainly includes cattle, poultry and goats. They provide a significant supply of food for households and also serve as a source of income.

2.4.4 HIV prevalence in Kabarole district

HIV prevalence estimate among adults for Kabarole district is 11 percent, which is significantly higher than Uganda's national rate of 6.4 percent (Fact sheet, 2008). The Annual Report on Basic Health Services Project (2002) in western Uganda reported a total of 19,000 persons were estimated to be living with HIV/AIDS in the district.

2.5 Data Collection

2.5.1 Types of Data

The study uses secondary data, two data sets, collected as part of a Community-Based ARV treatment for AIDS patients' research project by the University of Alberta and in conjunction with the Canadian Institute for Health Research and the Ministry of Health, Uganda. The two data sets used in this study were collected using two different approaches: an objective approach which collected quantitative information on household livelihood and a subjective approach that collected perception information on changes in well-being. Quantitative data was collected between 2006 and 2008 starting from the time patients were enrolled in the treatment programme. The perception data was collected between 2007 and 2008 after the patient had been on HAART treatment for a year. Details of the two surveys are presented in the proceeding sub-sections.

2.5.1.1 Objective approach: Household Livelihood survey

A household livelihood survey collected objective data on household livelihoods, using a standardized questionnaire. The questionnaire encompassed two sections. Section one contained a baseline survey that provides background information on household characteristics such as household size and composition by age, gender, education and location; and physical assets (land size, housing, livestock, and equipments/goods.

Section two of the questionnaire is a quarterly survey that provides data on household livelihoods, specifically, estimates of values from livelihoods activities such as crop production, livestock, forestry and forestry processing, wild, fishing and others such

as remittances. The data is collected in a series of five rounds (quarters) during the period of 2006/2008. It is important to note that not all patients started treatment at the same time. For example, the first round of the survey was carried out between March 2006 and April 2007 depending upon the time a patient enrols in the program.

The questionnaire was generally administered to household head or another adult member of the household in the absence of the household head. The survey questionnaires are presented in Appendix C and D. Although quarterly data is collected, this study only used data for the first round as data in the subsequent quarters are not yet available.

2.5.1.2 Subjective approach: Treatment partners perception survey

Another data set used in this study is the perception data, taken from a treatment partners' survey. The survey collected perception information over time, 2007/2008, for the same sample households as for the household livelihood surveys. The survey was conducted after the HIV/AIDS patient had been on HAART treatment for a year, allowing data to be collected on perceptions of changes in livelihoods. The questionnaire was administered only to treatment partners. Only those households with treatment partners as cohabitants[2] were selected for the perception survey. This was done because it is hypothesised that cohabitant treatment partners are likely to give a better perception of changes in household well being than non-cohabitant treatment partners. A similar approach was used by Macours (2002) in her comparison study for the direct and indirect approach to

---

[2] Cohabitant, in this study, refers to treatment partners who live in the same house with the patient.

12

collecting household level data from selected key community informants. The use of "third parties" in collecting information is an important technique to gain access to information. The third party can be knowledgeable about the subject being studied. However, happiness is a broad concept and can be hard to define. It is about people's inner perspectives and gives value to people's personal views of their lives (Diener *et al* 1997). Since happiness is about feelings or emotions, it can vary greatly from one individual to another, as individual perception is affected by a person's beliefs, attitude and expectations. It can be very difficult to provide accurate information on one person's inner feelings. Therefore, perception data from treatment partners may underestimate or overestimate the changes in patients' happiness and thus lead to biased perceptions or impressions.

2.5.2 The sample and sampling method

For both surveys, data were collected from households with an HIV/AIDS patient receiving HAART treatment under the community based ARV treatment pilot project. A sample of 190 HAART patients was selected as patients enrolled for HAART treatment program at the clinic. Patients who were found to be eligible for HAART treatment were asked if they would be willing to participate in the research project and those who indicated willingness to partake in the project were requested to complete a consent form.

The household livelihood survey collected data from a sample of 164 households in the first round. Although the initial sample was 190 households, some patients died before the household survey commenced and some could not be located from the addresses they provided after being enrolled in the program. The sample size for

perception data used in this study is only 67 households as more data is still to be

collected. Since this study depends on the integration of subjective and objective data,

these 67 households form the total effective sample used here.

3. LITERATURE REVIEW

3.1 Introduction

Chapter 3 provides an overview of related literature. The chapter starts with a review of empirical evidence of household livelihoods in the context of HIV/AIDS in Africa. Because some of the data is collected from caregivers of HIV/AIDS patients, I then turn to a review of literature on family care-giving for HIV/AIDS patients in Africa. Moreover, because I used data collected on subjective measures of well-being, the final section reviews literature on this topic.

3.2 Household livelihoods and HIV/AIDS

Various studies have identified HIV/AIDS as one of the factors impoverishing rural households in African society (Yamano and Jayne 2002). There is evidence that HIV/AIDS affects various categories of household's livelihoods such as human, physical, financial, social, and natural capitals. The effects of HIV/AIDS include loss of labour, loss of income due to prolonged illness if the patient /deceased was a bread winner, increase in costs for health care for the sick persons, and also higher cost for funeral. These events in turn have a negative impact on amount of land cultivated, crop yield and cropping pattern (Muwanga 2002, Barrett et al 1995). HIV/AIDS illness and death also potentially affects social capital by killing productive adults and as a result disrupt the social networks that provide households with community help and support (USAID 2005, Masanjala 2007). In the following section I focus on investigating literature related to the

impact of HIV/AIDS on three aspects of household livelihoods: labour, financial and diversification strategies.

3.2.1   Labour

The most immediate impact of HIV/AIDS related illness and death falls on the human capital base. Moreover, one of the critical characteristics that make HIV/AIDS unique is that it often affects the most productive age group in the society, on whom most of the households' members depend (Topouzis and du Guerny 1999). Topouzis and du Guerny (1999), and Rugalema (1999) documented that HIV/AIDS affects labour in two primary ways: the loss of labour production due to sick adults who cannot work anymore, and the loss of labour because of care that has to be provided by other household members. Moreover, the way in which households adjust to labour shortages varies according to resources of the households. For example, better off households may be able to hire workers or attract additional members to attempt to offset the loss of household members. (Yamano and Jayne 2004; Beegle 2003)

Several studies have attempted to link losses in labour, associated with HIV/AIDS related illness and death, to a reduction in household production. In Zimbabwe for instance, Kwaramba (1997) found that reduced availability of labour resources caused a reduction of 37-61% in production levels of households for assorted crops. Similarly, in Kenya, Yamano and Jayne (2002) found a 68% decline in net household production and where area under crop production decreased by 26% when the household head died. In only one case did we find a study in Uganda that indicated no significant change in agricultural production caused by HIV/AIDS induced labor shortages (Barnett and Blaike, 1992, in Jayne *et al* 2005).

16

3.2.2 Financial Resources

There is evidence that HIV/AIDS also negatively impacts the household's financial capital. The effect of a household labour shock discussed in the proceeding section can cause shocks to the household's capital resources as income are lost if the household member had been employed and because of increased expenditure, particularly on medical costs and funerals expenses. A study conducted by Yamano and Jayne (2002) in Kenya used a two year panel of households surveyed in 1997 and 2000 and found that the death of an adult reduces the household's labour supply and thereby negatively affecting household income.

According to Topouzis and du Guerny (1999), HIV infected households cope with higher costs by drawing down savings, borrowing money, seeking remittances and taking on debt at high interest rates. After depleting their financial assets the final step is disposing of productive assets such as land, equipments and draft animals (Mutangadura 2000). This process is supported by evidence from Namibia and Kenya which shows that households first attempt to dispose of small animals and other assets that have the lowest impact on long term production. Cattle and productive farm equipment are sold in response to severe cash requirement after incurring death in the family (Engh 2000, Yamano and Jayne 2004) which may pose a high risk to future household livelihoods (Stokes 2003).

3.2.3 Diversification

Diversification is generally recognized as an important strategy for decreasing the vulnerability of livelihoods. Because HIV/AIDS introduces a source of vulnerability in households, strategies could be influenced. Rural livelihood diversification is defined as a process by which rural households construct portfolio of activities and assets in order to survive and improve their standard of living (Ellis 2000, 1998).

The majority of people in Africa live in rural areas, and farming is the key livelihood activity. According to World Bank (2000), farming accounts for 35 percent of GDP and 70 percent of employment in sub-Saharan Africa. However, increasingly, literature suggests that livelihoods are dependent on a much wider base than agricultural production. There have been profound transformations in livelihood systems in Africa (Bryceson and Bank 2000). Rural household livelihoods are dependent on a variety of activities such as crop production, livestock, forestry products, fishing, wage and remittances, where the choice of activities mainly depends on access to different types of assets (Barrett *et al* 2001).

In rural areas of developing countries, diversification has been put forward as one of the strategies employed in order to protect households from risks (Abdulai and Rees 2001) Evidence from developing countries suggests that households use income diversification for ex- ante risk management or to cope, ex- post, with shocks (Rosenzweig and Binswanger 1993, Reardon *et al* 1992, Reardon *et al* 1998). Other factors responsible for observed income diversification at the household level include self insurance against risk in the context of missing insurance and credit markets (Kinsey *et al* 1998).

18

Despite the potential for HIV/AIDS to impact household livelihoods, we were only able to find a few studies which link household diversification strategies to issues of HIV/AIDS through agriculture has a positive influence on reducing vulnerability to HIV infection. Topouzis and du Guerny (1999) conclude that a diversification of livelihood opportunities loss of agricultural labour due to HIV/AIDS is likely to cause farmers to move to production of less labour intensive crops to ensure their survival. This often means a shift from cash to subsistence crops. Barret *et al* (1995) find little evidence of impacts of HIV/AIDS on crop diversity in Tanzania but in Uganda they find some evidence where poor households shift to subsistence crops.

3.3 Caring for HIV/AIDS patients in rural households

This section reviews literature on the care of HIV/AIDS patients in rural households. Information on care-giving is important for this study because of the labour resources which is required, because in homes, care-giving is an important part of HAART project.

Studies in Africa indicate that, most often, the burden of care for HIV/AIDS patients falls on family members, especially women (Olenja 1999, McNeil 1996). According to Kipp *et al* (2006) care giving responsibilities posed huge burden on women who are already overburdened with other household responsibilities as mothers, spouses and caretaker of homes. The few males that are found to be caregivers take up this responsibility by default because of an absence of female members in a family (Kipp *et al* 2006).

19

In Botswana, the burden of care falls on women and girls. When the demand for care increases, girls are found to sometimes drop out of school. If they are able to continue to attend school, they rarely have time for homework, and tend to be socially isolated with little time to interact (Lindsey *et al)*. A study by Robinson *et al* (2006) in sub-Saharan Africa confirms that girls do more caring than boys. A study in Botswana revealed that care-giving responsibilities reduce quality of life for the care givers. Olenja (1999) carried out a study with HIV/AIDS patients in Kenya and found that persons living with HIV/AIDS and their caregivers experienced a sense of isolation and stigmatization from their community. This study further indicated that many caregivers found religion to be a comfort for them.

Thirumurthy *et al* (2006) study on impact of AIDS treatment on market labour supply of adult patients receiving treatment, children and adults living in their households in Kenya finds that after initiation of treatment for HIV patients, time spent seeking health care and caring for sick family members dropped significantly for the caregiver.

3.4 Subjective measures of well-being

Although the focus of this study is on subjective well-being, I also mention about objective measures since I have included some of the objective measures in our regressions and this also helps to place the subjective measure in context. Although empirical literature on subjective well-being is growing, studies on developing countries are still limited. Economists have largely depended on objective measures of well-being, and generally linked well-being to the concept of utility, frequently focusing on income.

However, focusing on income can miss key elements of welfare (Graham 2005). According to Lokshin *et al* (2004), income based objective wellbeing measures often fail to account for important socioeconomic factors that could affect the level of households' well-being.

Studies on subjective well-being have previously been a subject for sociologists and psychologists, but it has become a research topic for economists in recent years (e.g., Frey and Stutzer 2000, Ravallion and Lokshin 2001, Wasmers *et al* 2008, Knight and Song 2006, Moghaddam 2008). Economists have recognized that people do not only base their behavior on what is available to them but on what they feel about the different options or constrains that they face (Royo and Velazoco 2005). Subjective measures may become more meaningful than objective measures, because they inform researchers about how people perceive their lives, and what they believe constitutes a better or worse condition.

3.4.1 Definitions of Well-Being

This section provides definitions of the key concepts used in this study: well-being, subjective well-being, happiness and living standard.

Well-being has been defined as "the state of being happy, healthy and prosperous". It implies satisfaction and happiness in a broad sense, including happiness with the society, the environment, health, housing, leisure, friends, marriage and family life (Van Pragg and Frijters 1999). Well-being is a concept that ranges from objective and subjective

aspects of individuals' happiness, to satisfactions of a given list of needs (Royo and Velazoco 2005).

Subjective well-being has been defined as people's evaluation of their lives that includes variables such as life satisfaction, marital satisfaction, lack of depression and anxiety and positive moods and emotion (Diener *et al* 1997, Diener and Scollon 2003). In other words it is a term that encompasses concepts pertaining to how people feel and think about their lives (Diener and Scollon 2003). Since the main livelihood measures that we investigate in this study are living standard and happiness, their definitions are also provided. Standard of living is generally referred to as the physical circumstances in which people live, the goods and services they are able to consume and the resources available to people and the way these resources are distributed within the population (The Social report 2007). It is often expressed in more objective than subjective and describes the circumstances of a person's life rather than a person's reaction to those circumstances. However subjective measures of standard of living not only include standard of living circumstances, reflected in objective measures, but also the persons' perception, thoughts, feelings and reactions to those circumstances (Diener 2005).

Happiness is considered to be the ultimate goal of life (Frey and Stutzer 2002). Veenhoven (1997) defines happiness as the degree to which people positively evaluate their overall life situation. Maslow (1943) theorized a set of individual needs. Maslow's Hierarchy of Needs includes physiological, safety, love/belonging, esteem and self actualization needs. These needs are frequently used as a starting point for evaluating the overall individual level of happiness. From the definition, it is apparent that happiness is

a broader concept than objective standard of living that also encompasses subjective aspects of living standards.

3.4.2 Determinants of Subjective Well-being

As the efforts will attempt to decompose the objective measures of well-being into determinants, I now turn to reviewing literature on the determinants. The determinants include income, education, age, gender, household size, social relationships, religious, employment, health and personality variables.

Income: Economic theory suggests that objective indicators such as income or expenditure are key predictors of well being. However, studies that relate objective indicators to subjective well-being provide an ambiguous picture. On average, people with high income are happier than those with less income. However, happiness across the life cycle remains constant, despite an increase in income (Easterlin 2001).

Kingdon and Knight's (2006) study on well-being and income, use national household survey data. Results from an ordered probit regression show a positive relationship between per capita income and happiness. Although the effect was positive and significant, the relationship was not strong. They find various factors that determine income also determine subjective well being but they differ in terms of importance and direction.

Ravallion and Lokshin (2002) found similar results on their study of self-rated welfare in Russia using the panel data and ordered probit method for data analysis. Both individual and household income showed a positive effect on subjective economic

23

welfare. Powdthavee's (2006) study on happiness and standards of living in South Africa, finds strong evidence of people reporting high perception quality of life scores when they believe that the household is doing well financially, compared to its past even after controlling for current income. However, when compared with objective external income measures, results were found to be insignificant.

Some research suggests that the effects of individual incomes may be non- linear in nature with smaller well-being effects attached to increase in income beyond expectation levels. A study by Herrera *et al* (2006) on comparative subjective well-being in Madagascar and Peru used panel data. Results indicated increases in per capita income were accompanied with an increase in perception of well-being but at a diminishing rate. The non-linear effect of income results obtained in Madagascar (Herrera 2006) is in line with results by Frey and Stutzer (2002) where the authors found that absolute income increases happiness at a diminishing rate.

Economic research finds evidence that once basic needs are satisfied, income relative to others in one social group matters more than one's own level of income (Clark and Oswald 1996; Ferrer-i-Carbonell 2005). Relative income is found to have a negative, significant impact on subjective well-being both in Madagascar and Peru. This result is in line with Lokshin *et al* (2004) for Madagascar, and Fafchamps and Shilpi (2003) for Nepal, where result indicates that households living in areas where their income level are lower than that of the area, tend to feel dissatisfied and thus affects their well-being. Helliwell's (2007) study on life satisfaction and quality of development has also found relative income to have a strong effect on life satisfaction. Moreover, there is evidence

that life satisfaction rises with income less in OECD than in non-OECD (Helliwell and Putnam 2005).

Education: The relationship between education and happiness is somewhat mixed. In most studies the effects of education on subjective well being are found to be small and significantly positively correlated with subjective well being. Ravallion and Lokshin (2002) in Russia found higher individual education raises self-rated welfare, but household education makes no significant difference. Kingdon and Knight (2006) find education in South Africa has a positive effect on happiness. However, the effect of education falls, but does not disappear, suggesting that much of the effects on education on happiness come through income effects. Ravallion *et al* (2001) found that households in Madagascar with larger shares of well educated members had, on average, higher welfare perception. Similar results are also found for developed countries, although the effects of education on subjective well being are found to be small (Helliwell 2007; Diener *et al* 1999).

One of the arguments provided in the literature is that educated persons are happier because of better job and higher income rather than their education experience per se. In contrast to the above studies, Ravallion and Lokshin (2002) in Russia, Frey and Stutzer (2002), and Namazie and Sanfey (1999) found no relationship between happiness and education.

Higher education has also been associated with lower self-rated life satisfaction/happiness. Powdthavee (2006) in South Africa found a significant negative relationship between education and the reported well-being scores when controlled for

25

durable assets and income. Similar results were also obtained in developed countries (Clark and Oswald 1996). One explanation given for this result is that the returns to higher education in developing countries may be measured purely in terms of higher wealth (Powdthavee 2006). Other arguments provided in the literature correspond to the theory that people with higher levels of education have higher expectations of life and therefore experience dissatisfaction with life, income or lack of jobs (Oswald 1997, Veenhoven 1997).

Age: Research findings generally suggest that age does affect well being, though overall, the effects are not very strong. Kingdon and Knight (2006) estimated separate ordered probit models for satisfaction/happiness and income and found age had a positive impact on happiness and income. Similarly, Ravallion and Lokshin's (2002) study on self-rated economic welfare in Russsia using ordered probit regression on panel data for Russia for 1994 -1996, found happiness to be increasing with age. However, the effect of age on happiness has differed in other studies. The findings of most studies are that there is no linear relationship between age and happiness. However the shape of relationship differs. As study by Powdthavee (2006) on happiness and standard of living in South Africa, found the relationship between age and happiness to be U-shaped, where happiness is first decreasing with age and then starts to increase after some point. Similarly, Knight and Song's (2006) study on subjective well-being and its determinants in rural China showed a U-shaped relationship between age and subjective well-being. Results for developed countries also indicated that the young and older people are likely to be happier than middle aged ones. (Helliwell 2007, van Praag *et al* 2000, Blanchflower and Osward 2003). Two explanations of the relationship have been suggested in the

literature that older adults have lowered expectations and thus have less of discrepancy between their lives and their ideas, older adults are likely to learn more effective ways of regulating their emotions (Argyle 1999).

Gender: Studies have found mixed results on the relationship between gender and happiness. Studies in South Africa, Russia, and Madagascar and elsewhere revealed that gender is not an important variable in predicting happiness (Kingdon and Knight 2006, Powdthavee 2006, Ravallion and Lokshin 2002, Herrera *et al* 2006).

Other studies have found that in general, women are happier than men (Easterlin 2001; Oswald 1997). Knight and Song (2006) examined subjective well-being determinants in rural China and found that males were less happy compared to females. Opposite results are found by Ravallion and Lokshin (2001) on their study of subjective economic welfare in Russia where male are found to be happy compared to female.

Household size: The effects of number of children are found to be mixed. Some studies found no significant impact of number of children to happiness (Ravallion and Lokshin 2001; Ravallion and Lokshin 2002). Other studies found a negative effect of children on happiness (Frey and Stutzer, 2000). On the other hand, a study by Ravallion and Rockshin (2002) in Russia using cross sectional data found that self-rated welfare rises with family size. Contrary, when used panel data, household size had no impact on subjective well-being. One of the explanations given for the difference could be the little variations in household size over a two year period to identify the true effect (Ravallion and Lokshin 2001).

27

Social relationships: The finding from research on the correlate of life satisfaction is that subjective well-being is best predicted by one's social connections (Helliwell and Putnam 2004). Oswald (1997) confirmed that married people are generally happier than unmarried people and also have better mental health. Marriage is found to be positively associated with happiness compared to those who were never married or divorced in Russia (Ravallion and Lokshin 2002). Most studies in developed countries also confirmed that married people showed a significant higher level of happiness compared to persons who were divorced, widowed or never married (Blanchflower and Oswald 2003, Helliwell 2003, 2007, Diener *et al* 1999; Hayo 2004, Wassmer *et al* 2008). There are, however, also studies that show a negative relationship of marriage and happiness. Contrary, unmarried people showed high level of subjective well-being in Madagascar (Herrera *et al* 2006). This could be that people get used to satisfying stimuli and therefore their happiness decreases (Frey and Stutzer 2004).

Helliwell and Putnam (2004) in studying health and happiness found that social capital had a significant association with well-being. The results of the ordered probit estimation showed social networks such as increased contact with friend, neighbors and family, and social trust were strongly associated with higher happiness levels.

Religious: Studies have shown a significant effect of religion on well-being. Happiness is found to be positively associated with religious activities such as belonging to religion, frequency of attendance at worship services, and faith (Diener *et al* 1999).

Employment: Employment status has also been found to affect subjective well-being. Being unemployed is found to reduce happiness (Ravallion and Rokshin 2001,

Powdthavee 2006, Helliwel and Putman 2004, Clark and Oswald 1994).Graham (2005) compared results from Russia and Latin America to that of the United State and found, in all contexts, unemployed individual were less happy than others. Moreover, in the Unites State, self employed people were happier than employed people, while in Latin America self employed were less happy than those employed by others people. These results may be because in United States, self employment is a choice while in Latin America self employed people are often in the informal sector by default (Graham 2003).

Health: Heath is considered to be one of the influential factor of happiness (Myer and Diener 1995, Veenhoven 1997 and Easterlin 2001). Various studies found health status to have a positive effect on happiness (Ravallion and Rokshin 2001, 2002, Kingdom and Knight 2006, Helliwell and Huang 2005, Wassner *et al* 2008). The authors concluded that the association between happiness and self reported (perceived health) may be strong even if the association between happiness and actual health (objective health) is relatively weak.

Personality variables: There is a general agreement that personality characteristics are major predictors of happiness (Diener and Suh 1997, Furnham, Diener *et al* 1999, Diener 1984). In a study by Ravallion and Lokshin (2002) in Russia, personality variables showed a strong effect.

3.5 Empirical application of literature to Uganda

Although this study investigates changes in well-being, most of the literature discussed above deals with the determinants of levels of well-being rather than changes. However, determinants of levels of well-being may also be related to changes of well-being. In the following sections, I extend the logic presented in the studies above to address the potential impacts of determinants on changes in well-being. From the above literature, I designed the regression models for changes in subjective well-being measures: changes in living standard and changes in happiness. I have identified eight explanatory variables as potential important to changes in living standard. For the change in household living standard model, the literature suggests that the following variables affect productivity.

Change in living standard = *f(age, marital status, treatment characteristics, household labour, wealth, income, education, employment status, health and diversification)*

(3.1)

Since happiness is a broader concept than living standards, the literature review suggests the following variables to have effect on the perceived change in happiness.

Change in happiness = $f($ *age, education, household size, treatment partner*

characteristics, health, wealth, income and social capital) (3.2)

These are the basic relationships that will be explained empirically in subsequent

chapters.

3.6 Conclusion

While the literature offers many interesting results on measures of well-being,

there remains a shortage of empirical studies of subjective measures of well-being in sub-

Saharan Africa and Uganda in particular. Moreover, little of this work is linked to

HIV/AIDS. Therefore my analyses aim to contribute to the empirical literature by

relating changes in objective indicators to changes in subjective measures of well-being

for selected HIV/AIDS patients' households in rural Uganda.

4. METHODS

4.1 Introduction

This chapter presents the methods used in modeling changes in well-being. The chapter starts with background information regarding subjective and objective measures of well-being, particularly focusing on strengths and weaknesses associated with objective and subjective data. The chapter then specifies the variables and models to be evaluated. The chapter concludes with a discussion of how the data will be analyzed.

4.2 Background to measures of well being

There are two general approaches found in the literature for measuring well-being; objective and subjective. Over the last few years, there has been an increased focus on combining objective and subjective research data especially in the area of assessment (Kingdon and Knight 2004, Ravallion and Lokshin 2002). However, the use of both subjective and objective measures still remains uncommon practice in the study of rural household livelihoods. Although the focus of this study is on subjective well-being, I also mention objective well-being measures because I try to investigate changes in subjective well-being as a function of objective measures. It is therefore important to highlight the strengths and weakness of both objective and subjective measures.

4.2.1   Objective well-being measures

Objective well-being approaches mainly focus on objectively verifiable aspects of life such as income, materials and social conditions. Diener and Suh (1997) described indicators of objective well-being as quantitative statistics. One of the strength of objective well-being measure is objectivity (Diener and Suh, 1997). The authors state that objectivity means that the variables can be measured with greater precision and that they do not depend on people's perceptions. In other words, the objective measures can be easily quantified or defined as they depend on easily counted units such income, health, education etc. Objective well-being measures also make it possible to quantify changes in well-being (Nicoletti and Pryor 2001) which may be important in influencing policy makers.

Objective measures, however, have some disadvantages. First, objective well-being is often contaminated by measurement problems. For example underreporting of income and/or agricultural output is a common problem. Second, objective well-being measures may not accurately reflect peoples' experience of well-being. Even if indicators are measured accurately, they likely fail to tell us how individuals experience and perceive their lives. Therefore, objective measure may neglect important aspects of well-being.

4.2.2   Subjective well-being approach

Subjective measures consist of feelings about life and how people perceive their own lives. The approach is mainly used for the assessment of life satisfaction or

happiness. According to Diener and Suh (1997) understanding of well-being of an individual involves evaluation of an individual's cognitive and affective reactions to their whole life. Subjective approaches are usually based on survey questions with scales that rate peoples' perception of life satisfaction or happiness. For instance, how would you say things are these days? Would you say you are very happy, pretty happy or not too happy these days (Kahneman *et al* 2006).

Since I am trying to investigate the perception of change in happiness and household living standards, it is also important to highlight some of the strengths and weakness of subjective measures of well-being. First, subjective measures are found to capture experiences that are important to the individual. The approach allows individuals to judge their own lives according to what they themselves value an important (Alexandrova 2005). Therefore these measures may provide reliable information on how well individuals and society as a whole are doing. However, subjective well-being approaches also have some drawbacks. One possible drawback is that it can be hard to believe that all responses are accurate. For example, responses to subjective questions are said to be more prone to mood biases (Schwartz and Strack, 1999), where the response may be more dependent on temperament and personal relationships of the respondent at the time of the interview.

4.3 Specification of Empirical Models

In specifying the estimated equations, we started with a number of variables reflected in general equations 3.1 and 3.2 (chapter 3, section 3. 5). However, some of

these variables were dropped because they were insignificant. For example, treatment partner, I hypothesized treatment partners could affect all measures of well-being because the subjective data used in this study is the perception of treatment partners and could be influencing changes in well-being. However, none of the treatment partners characteristics were significantly influencing variations in responses. Others were kept despite their insignificance because of their theoretical importance. Following are the variables included in our final regression models.

Model 1: An ordered probit model for change in household living standard

$$\Delta s \text{ in living standard} = \beta_1 agehhh + \beta_2 adults + \beta_3 edup + \beta_4 femalep + \beta_5 netsaving + \beta_6 diversity + \beta_7 \Delta CD4 + \beta_8 employed + \varepsilon, \qquad (4.1)$$

Model 2: An ordered probit model for changes happiness of treatment partner

$$\Delta s \text{ in happiness of treatment partners} = \beta_1 agetp + \beta_2 edup + \beta_3 minors + \beta_4 pensioners + \beta_5 netsaving + \beta_6 \Delta CD4 + \beta_7 church + \beta_8 selfhelp + \varepsilon, \qquad (4.2)$$

Model 3: An ordered probit model for determinant of changes in happiness of patients.

Δs in happiness of patients = $\beta_1 agep + \beta_2 edup + \beta_3 minors + \beta_4 pensioners +$

$\beta_5 netsaving + \beta_6 \Delta CD4 + \beta_7 church + \beta_8 selfhelp + \varepsilon,$

$$(4.3)$$

Dependent variables are defined in table 4.1 (section 4.4) and explanatory variables and their expected effects are defined in table 4.2 (section 4.5).

4.4 Definition of dependent variables

These measures of well-being, shown in the models above, are created from the survey questions presented in Table 4.1. All dependent variables are measured as five category ordinal variables on a scale of 1 to 5, where the respondent chooses one option. In order to ease interpretation of my regressions, the original rating scale in Table 4.1 was re-coded as 1 being "a lot worse off"/ "much less happy" and five being "a lot better off"/ "much happier", so that greater numbers imply greater standards of living and happiness.

Table 4.1 Questions and responses options defining the dependent variables

Questions	Response/scale categories
1. Compared to when you started as treatment partner, how would you describe the living standard of your household? [Change in living standard, ΔLS]	1. We are a lot better off. 2. We are a little bit better off. 3. We are about the same. 4. We are a little bit worse off. 5. We are a lot worse off.
2. Compared to when you started as a treatment partner, how would you describe your general happiness?[Change in happiness of treatment partners, ΔHTP]	1. I am much happier. 2. I am a little bit happier. 3. I am about the same as in terms of happiness. 4. I am a little bit less happy. 5. I am much less happy.
3. Compared to when you started as a treatment partner, how would you describe your patient's happiness?[Change in happiness of patients, ΔHP]	1. S/he is much happier than last year 2. S/he is a little bit happier than last year 3. S/he she is about the same as last year in terms of happiness 4. S/he is a little bit less happy than last year 5. S/he is much less happy than last year.

4.5 Independent variables description and hypothesis

Literature in chapter 3 suggests that households' living standard and happiness are influenced by a number of socioeconomic variables. Although living standard and happiness are related concepts, they are hypothesized to be influenced by different factors. These factors may help explain any differences that are likely to be observed in changes in living standard and happiness.

The hypothesized directional effects (+/-) of explanatory variables on the dependent variables based on the literature review are presented in table 4.2.

Change in living standard: Changes in household living standard are hypothesized to be influenced by factors that affect the productivity of households.

I expect age of household (*agehhh)* is positively related to increased change in living standard. I assume that productivity increases with age, up to a point. When HIV/AIDS enters the households, HIV/AIDS patients are taken out of production. Since a majority of household heads in the sample is patients (77%) and falls within the productive age group, I expect an increasing productive labour as they get better due to HAART treatment which may lead to increased living standard.

Similarly, I, also expect the number of household members in the range of 16 -60 years *(adults)* to have a positive effect on changes in living standards because adults are key productive assets to the household. When HIV/AIDS enters the households, caregivers devote their time to caring for the patients.

38

Table 4.2: Definition of explanatory variables and expected effects on changes in living standard and changes in happiness of treatment partners and patients

Explanatory variables	Change in living standard of HIV/AIDS households	Change in happiness of treatment partner	Change in happiness of patients
Age of household head (*agehhh*)- *years*	+	N/A	N/A
Age of treatment partner (*agetp*) –*years*	N/A	+/-	N/A
Age of patient (*agep*) – *years*	N/A	N/A	+/-
Number of people in each age category:			
0-7 years (*minors*)	N/A	+/-	+/-
16 – 60 years (*adults*)	+	N/A	N/A
>60 years (*pensioners*)	N/A	+/-	+/-
Education of patient (*edup*)- *years*	+	+	+
Gender of patient (*femalep*) – *1=female, 0 =male*	+/-	N/A	N/A
Household net-saving (*netsaving*) – *Ugshs*	+/-	+/-	+/-
Income diversity index (*diversity*) - *Berry index between 0 and 1*	-	N/A	N/A
Change in CD4 count (Δ*CD4*) –*between 1 and 6 months*	+	+	+
Belong to church (*church*)- *1=Yes, 0 = No*	N/A	+	+
Belong to self-help association (*selfhelp*) *1 =Yes, 0 = No*	N/A	+	+
Any household member began working for wage (*employed*) – *1 = Yes, 0 = No*	+	N/A	N/A

Note: Variable names are in parentheses; N/A- not applicable, +positive effect, - negative effect, +/-either positive or negative effect is expected,

As patients get better due to HAART, I expect caregivers to have more time to devote to other productive activities of the household leading to increased household labour resources that can be reallocated to different production activities. This is likely to increase productivity, which in turn leads to increased living standard.

Patients' education (*edup*) is expected to have a positive effect. Literature indicates that a higher level of education is related to a higher income which affects household standard of living (Aardt 2008). For example, I expect higher educated individuals to be more likely to work for wages. As educated patients get better, they are expected to return to work leading to more available financial resources and higher living standards.

There are a number of variables that could be important but for which I do not have prior expectations. I have no prior expectation on the effect of gender (*femalep*) on changes in living standards. Moreover, the effect of net savings (*netsaving*) is difficult to ascertain. This variable is a proxy for wealth and I am uncertain whether wealthy or less wealthy households may experience greater change in living standard from HAART treatment.

I expect the effect of income diversification index (*diversity)* on changes in living standard to be negative. When HIV/AIDS enter the households, I expect those households that are more diversified to be not as hard hit by HIV/AIDS shock as specialized households. Income diversity is constructed to measure household diversification for all income activities. The diversity index was calculated by use of the Berry Index (BI).

The Berry index (BI) is calculated as one minus the sum of squared of income for all income activities:

$$BI = 1 - \sum S^2 \qquad\qquad (5.1)$$

where, S is the share of income from different income activities (crop, livestock, forestry and forestry processing, wild, fishing, wage and remittances). The Berry Index diversity index ranges between 0 and 1, where zero indicates highly specialized while 1 indicates highly diversified. Income was calculated as the sum of both cash and subsistence income including the value of all produce, irrespective of whether they are consumed, retained or sold.

Change in patient CD4 cell counts ($\Delta CD4$) is calculated as the difference in CD4 levels between the first month (baseline) and six months of treatment, with a positive change being related to an improvement in health status. The CD4 cells are a crucial component of immune systems, and as their numbers are depleted the immune system becomes increasingly compromised. Change in CD4 cell count is expected to have a positive effect on change in living standard as healthy people are more productive. Similarly, if a member of household starts working for wage (*employed*), I expect a positive impact on change in living standard, as more financial resources will be available to invest and/or support other members of households.

Change in happiness of treatment partner and patient: Happiness is a broader concept than living standard. What makes one person happy may not be important for the

other. This makes it difficult to define or measure and thus hard to hypothesis the directional effect of some of the socio-economic factors.

The expected signs of age of treatment partners *(agetp)* and age of patients *(agep)* as they relate to change in happiness of treatment partner and patients, respectively, are indeterminate. Similarly, it is unclear whether households with more young children *(minors)* or elders *(pensioners)* experience greater change in happiness from HAART. Although children and pensioners may be regarded as a cost to a household, in a production sense, I am uncertain of the directional effect on changes in happiness especially as a result of HAART. Therefore these will be assessed by use of a regression analysis.

Patient education *(edup)* is likely to have a positive effect on changes in happiness of treatment partners and patients. The same argument as for living standard applies where theory suggests that higher education level leads to increased income and thus more happiness. We expect highly educated patients to be working for wage as they get better as a result of HAART, resulting in more available financial resources and thus are in a better position to support other members of the households including treatment partners whom are likely to depend on for material or financial support.

It is hard to ascertain whether the effect of household net saving *(netsaving)*, as a proxy for wealth, is likely to be bigger or smaller as patients get better due to HAART. Therefore the expected sign on change in happiness of treatment partners and patients is indeterminate.

Change in CD4 count ($\Delta CD4$) as a result of HAART, is expected to have a positive effect on change in happiness of treatment partners and patients, following the theory that health people are happier.

The expected sign of belonging to a church (*church*) on change in happiness of treatment partners and patients is positive. Literature provides evidence that social capital are important to happiness, I expect people with more social capital to rebound more easily from HIV/AIDS shocks. Therefore, a positive change in happiness is expected. Similarly, belonging to a self-help association (*selfhelp*) is expected to have a positive effect on changes in happiness. As patients get better, more time becomes available to devoting more hours to self-help activities. This is likely to increase benefits e.g, income which in turn leads to increase happiness.

4.6 Estimation Approach

I have specified three empirical models that are used for analyses of changes in subjective well-being. The three models investigate the determinants of perceptions of treatment partners regarding 1) change in household living standard, 2) change in happiness of treatment partners and 3) change in happiness of patients. Since the dependent variables are ordered responses, Ordinal Least Square (OLS) regression is not appropriate. Therefore, I used an ordered probit model. According to Sy *et al* (1997), there are two distinct advantages to using the ordered probit model over an ordinary least squares (OLS) regression. The first is that the heteroskedasticity problem that would normally arise when performing a regression on a discrete dependent variable is

eliminated. Secondly, maximum likelihood estimates are asymptotically normal and consistent under general conditions.

The underlying model consists of one equation relating the latent variable; change in living standard (ΔLS^*), change in happiness of treatment partners (ΔHTP^*) and change in happiness of patient (ΔHP^*), to independent variables. Following Green (2003) these models are described as:

$$\Delta LS_i^*, \; \Delta HTP_i^*, \; \Delta HP_i^* = \quad \beta X_i + \varepsilon_i \qquad\qquad (4.4)$$

where ΔHP_i^*, ΔHTP_i^* and ΔLS_i^* are unobserved, β is a vectors of unknown parameters, X_i and ε_i are vector of explanatory variables and a random error term, respectively and i, denotes an individual household observation. Ordered probit models assume that the rating measures that are available are based on the unobserved dependent variables ΔHP_i^*, ΔHTP_i^* and ΔLS_i^*. The observed variables for the change in household living standard (ΔLS) and change in happiness (ΔHTP, ΔHP) are related to the corresponding latent variables. By applying the ordered probit model, in this study, the five categories values represent the five perception ratings which are given values 1, 2, 3, 4 and 5:

$$
\Delta LS_i =
\begin{cases}
\textit{1. a lot worse off} & \textit{if} & \Delta LS_i^* \leq \delta_1 \\[2mm]
\textit{2. - little bit worse off} & \textit{if} & \delta_1 < \Delta LS_i^* \leq \delta_2 \\[2mm]
\textit{3. - about the same} & \textit{if} & \delta_2 < \Delta L_i^* \leq \delta_3 \\[2mm]
\textit{4. - little bit better off} & \textit{if} & \delta_3 < \Delta LS_i^* \leq \delta_4 \\[2mm]
\textit{5. - a lot better off} & \textit{if} & \delta_4 < \Delta LS_i^*
\end{cases}
\qquad (4.5)
$$

$$
\begin{aligned}
\Delta HP_i = \\[2mm]
\Delta HTP_i
\end{aligned}
\begin{cases}
\textit{1. - much less happier} & \textit{if} & \Delta HP_i^*, \ \Delta HTP_i^* \leq \mu_1 \\[2mm]
\textit{2-little bit less happier} & \textit{if} & \mu_1 < \Delta HP_i^*, \ \Delta HTP_i^* \leq \mu_2 \\[2mm]
\textit{3 - about the same} & \textit{if} & \mu_2 < \Delta HP_i^*, \ \Delta HTP_i^* \leq \mu_3 \\[2mm]
\textit{4 - a little bit happier} & \textit{if} & \mu_3 < \Delta HP_i^*, \ \Delta HTP_i^* \leq \mu_4 \\[2mm]
\textit{5 -much happy} & \textit{if} & \mu_4 < \Delta HP_i^*, \ \Delta HTP_i^* \quad (4.6)
\end{cases}
$$

The μ's and δ's are unknown parameters defined as a range of observed dependent variables. ΔHP_i, ΔHTP_i and ΔLS_i, are to be estimated along with parameter β. According to Green (2003), the distributions of the error term are assumed to be normal and the estimated μ and δ values follow the order $\mu_1, \delta_1 < \mu_2, \delta_2 < \mu_3, \delta_3 < \mu_4, \delta_4 < \mu_5, \delta_5$. Following Green (2003), the probability function of ΔLS, ΔHTP and ΔHP that apply in the analysis have the form:

Prob (ΔLS_i, ΔHTP_i, $\Delta HP_i = 1$) = $1 - \Phi(\beta'X_i)$

Prob (ΔLS_i, ΔHTP_i, $\Delta HP_i = 2$) = $\Phi(\mu_1 \delta_1, -\beta'X_i) - \Phi(-\beta'X_i)$ (4.7)

Prob (ΔLS_i, ΔHTP_i, $\Delta HP_i = 3$) = $\Phi(\mu_2, \delta_2 -\beta'X_i) - \Phi(\mu_1, -\beta'X_i)$

Prob (ΔLS_i, ΔHTP_i, $\Delta HP_i = 5$) = $1 - \Phi(\mu_4 - \beta X_i)$,

where Φ is the standard normal density. This is the basic model I follow in the analysis. However, with an ordered probit model one cannot directly interpret the magnitude of the impact from the coefficient estimates. Therefore, marginal effects of each independent variable are calculated in order to evaluate the effects of changes. Following Green (2003), the marginal effects of the explanatory variables are described by the following formula:

$$\frac{\partial\,Prob\,(\Delta LS_i, \Delta H_i = 1)}{\partial X_i} = -\Phi(\mu - \beta'X_i)\beta$$

     (4.8)

$$\frac{\partial\,Prob\,(\Delta LS_i, \Delta H_i = 2)}{\partial X_i} = [\Phi(\mu_1 - \beta'X_i) - \Phi(\mu_2 - \beta'X_i)]\beta$$

$$\frac{\partial\,Prob\,(\Delta LS_i, \Delta H_i = 5)}{\partial X_i} = \Phi(\mu_4 - \beta'X_i)\beta$$

As indicated in the equations, the marginal effects for the ordered probit model are calculated for each outcome at a mean value (STATA version 10) and they are interpreted as the probabilities of changes in the explanatory variables from one category value to the next. This informs us of the relative changes in the dependent variable as a result of a change in an explanatory variable. For my analysis, I normalized the data so that marginal effects are interpreted relative to one standard deviation of change in the independent variables. The sign of the marginal effect do not necessary correspond to the coefficients signs (Long 1997). This is because

$$\frac{\partial \, Prob \, (\Delta LS_i, \, \Delta H_i = 2)}{\partial X_i} = [\Phi \, (\mu_1 - \beta'X_i) - \Phi \, (\mu_2 - \beta'X_i)]\beta$$

(4.9)

can be negative. It is possible for the marginal effect of X_i to change signs as X_i changes. Since the marginal effect of an ordered probit model is interpreted as the change in the probability of being in a particular category given a change in a dependent variable, it is possible for the marginal effects of the independent variable to change the sign as the independent variable changes. Thus means that the slope of the probability can either be positive or negative.

4.7 Econometric issues

Although living standard and happiness are distinct concepts, they are likely related. For example one could argue that changes in living standard affect changes in happiness of treatment partners and changes in happiness of patients. I therefore considered specifications with the change in living standard as a right hand side variable to explain the change in happiness of treatment partner and change in happiness of patient. However, doing so creates a potential endogeneity problem, as it is not clear whether changes in living standard affects changes in happiness of treatment partner and changes in happiness of patient, or vice versa. Endogeneity creates problems in econometric models and is likely to cause biased estimates. I tried to overcome the effects of endogeneity using a bivariate ordered probit regression model. This approach jointly estimates happiness and living standard perception measures of change in well-being. However, it was difficult to identify instrumental variables that distinguish one model from the other given the limited data available. Therefore, results from these models were not conclusive. Preliminary results are presented in Appendix E. Only the results from single ordered probit models are presented in the body of thesis.

5. RESULTS AND DISCUSSION

5.1 Introduction

The chapter starts with the descriptive analysis of data used in the study. It proceeds by exploring the main research question of this study: "What factors influence variations in changes in household living standard, changes in treatment partners' happiness and changes in patients' happiness". Results for the ordered probit models which examine the socioeconomic factors influencing changes in living standard, changes in happiness of treatment partners and changes in happiness of patients are then presented.

5.2 Descriptive statistics of explanatory variables

Summary statistics of all independent variables used in this study from equations 4.1, 4.2 and 4.3 (chapter 4) are presented in Table 5.1.

Results show the average age of household head (*agehhh*) falls within the productive age group at 41 years. This is close to the average age of patient (*agep*) because 77% of patients are also household heads. However, the mean age of treatment partners (*agetp*) is less than the mean age of patients. On average, the household has a mean of 5.7 members (*data not in table*) and the household make-up is mainly adults (*adults*) with few minors (*minors*) and almost no pensioners (*pensioners*).

Table 5.1: Descriptive Statistics of Explanatory Variables (N=67)

Explanatory Variables*	Mean	Standard Deviation	Minimum	Maximum
agehhh (years)	41.2	9.5	23	77
agetp (years)	29.0	14.5	10	61
agep (years)	37.1	7.3	22	55
Number of household members in each age category:				
minors (continuous)	1.0	1.1	0	5
adults (continuous)	3.2	1.8	1	9
pensioners (continuous)	0.04	0.27	0.00	2.00
edup(years - continuous)	4.4	3.4	0	15
femalep (1=female, 0=male)	62.3%			
netsaving (Ugandan shillings)	-100,866	349,246	-2,000,000	400,000
diversity (Berry Index from 0 and 1)	0.3	0.2	0	0.7
$\Delta CD4$ (continuous)	202.4	160.9	-138.0	705.0
employed (1=Yes, 0= No)	0.2	0.4	0	1
church (1= Yes, 0 = No)	0.4	0.5	0	1
selfhelp (1 = Yes, 0 = No)	0.1	0.3	0	1

Definitions of variables are found in Table 4.2

Data on education level of the patient *(edup)* indicates that patients are generally

educated below the secondary school level. The mean education level of patient (4.4

50

years) is similar to that of household heads (4.0 years) (*data not shown in table*). About 62% of patients are females (*femalep*) compared to males while 60% of treatment partners are females compared to males (*data not shown in table*). Other additional information on household head characteristics are contained in Appendix F.

Net savings (*netsaving*) was identified as a wealth indicator to use in the regression models. Result shows a negative mean of net savings indicating most households live in debt (44.8%) or with no savings (41.8%) (*data not shown in table*).Other indicators of *wealth* are contained in Appendix F. To summarize these data briefly, I observe a mean land holding of 1.8 hectares per household, an amount that indicates these households are small-scale farmers or subsistence farmers. However, about 13.4% of households are landless. Most land owned is crop land and the most grown crops are maize, field beans, potatoes, sweet potatoes, yam and cassava. With regard to livestock, the most owned livestock types are chickens (58%), and goats (35.8%). Very few cows and no donkeys, which are used as draft power, are owned, implying the use of traditional practices such as hand-hoes for cultivation, which is labour intensive. Most of the houses in the sample have their walls made of mud soil (88.1%) and 95.5% have a roof made of iron. Most households (83.6%) own their houses and the rest are either renting the house alone or with other household members. With respect to household possession of productive equipments and luxury goods, results indicate that radios were common and used as a source of information. Moreover, about 9% of the households owned a hand phone. Approximately one third of the households owned a bicycle (30%). Very few households own a stove (3%) or a refrigerator (6%).

None of the households were sufficient wealth to own a car, tractor, chain saw, wheelbarrow, TV, or a plough.

With respect to the diversity index (*diversity*), average diversity of household is 0.3 indicating sample households are somewhat specialized. Results indicate that the majority of households derive their income from crop production and contribute the highest mean household income share (51%). Appendix G contains the figures that show income from different livelihood activities. The other half of income is diverse, small categories being made up of livestock, remittances, business, wage, wild, fishing, forestry and forestry processing.

Change in CD4 cell count ($\Delta CD4$) is an important indicator of disease progression, where the lower counts indicates weaker immune systems. The change in CD4 count variable is identified as a proxy for health that indicates the variability in treatment effects. The distribution of changes in CD4 cell count is shown in figure 5.1. The mean change in CD4 cell count between 1 and 6 months is 202 cells per cubic millimeters. Almost all the patients included in the sample households indicate a positive change in CD4 cell counts except one patient. In any case, there is relatively little variations in the data as indicated by the standard deviation in Table 5.1. Though these results shows improvement in health status experienced by patients, the limited variability in the data may make it difficult to differentiate between levels of CD4 and their impacts on measures of well-being.

Figure 5.1: Distribution of changes in CD4 cell counts at 6 months of treatment
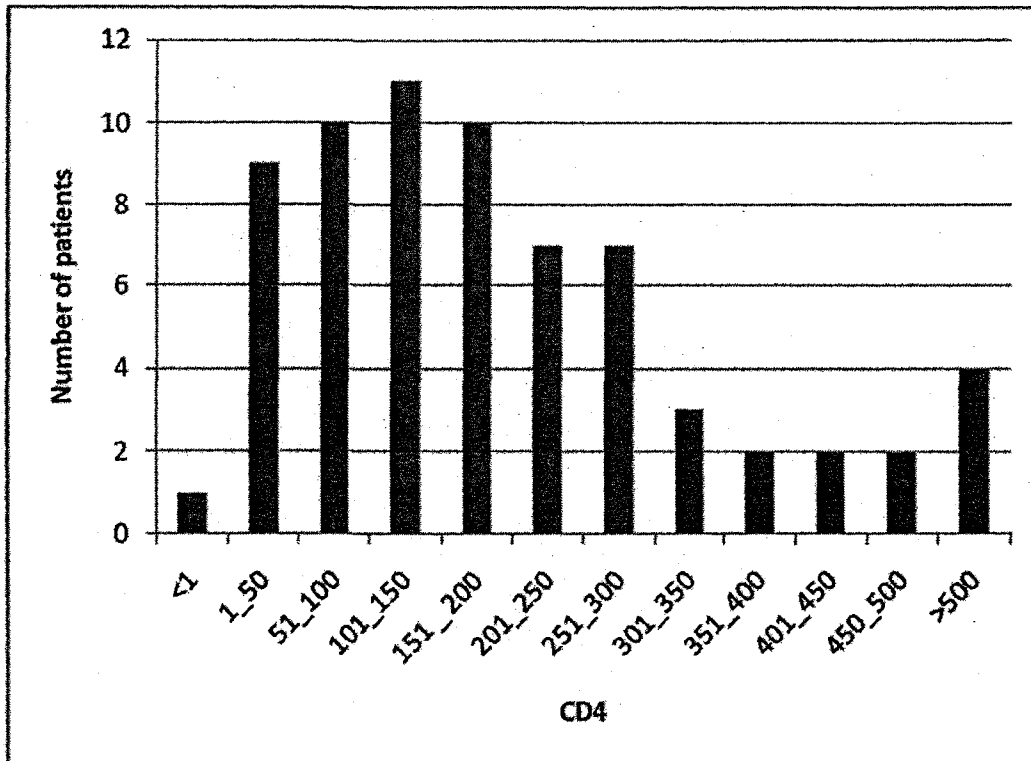
5.3 Descriptive statistics of dependent variables

To measure changes in household living standard, changes in treatment partner and patient happiness, respondents were asked to rate their perceptions on a five point scale (Table 4.1 in Chapter 4). Table 5.2 presents the descriptive statistics for changes in living standard, changes in happiness of treatment partners and patients.

The mean levels for all our subjective measures of well- being in Table 5.2 are greater than 3 indicating generally positive change in household well-being. We apply a t-test and Analysis of Variance (ANOVA) to test for significance difference between mean levels of change in living standard and happiness reported by males and females

and find there are no significant differences. Both male and female treatment partners

report a higher mean value of change in living standard and change in happiness. The

absence of a significant difference between the level of male and female is, however,

consistent with the general reported gender differences on various aspect of well-being.

Table 5.2 Mean change in household living standard, change in treatment partner and patients' happiness for the sample household

Subjective measures	Mean (n = 67)	Standard Deviation	Minimum	Maximum
Change in household living standard	3.79	0.84	2	5
Male	3.78 *(0.17)*			
Female	3.80 *(0.13)*			
Change in happiness of patients	4.45	0.7	2	5
Male	4.56 *(0.13)*			
Female	4.38 *(0.11)*			
Change in happiness of treatment	4.19	0.7	1	5
Male	4.30 *(0.90)*			
Female	4.13 *(0.13)*			

Note: standard errors in parenthesis

Details of treatment partners' perceptions of change in well-being are presented in

figure 5.1.

Figure 5.2: Responses to Well-being Questions

a) Change in living standard
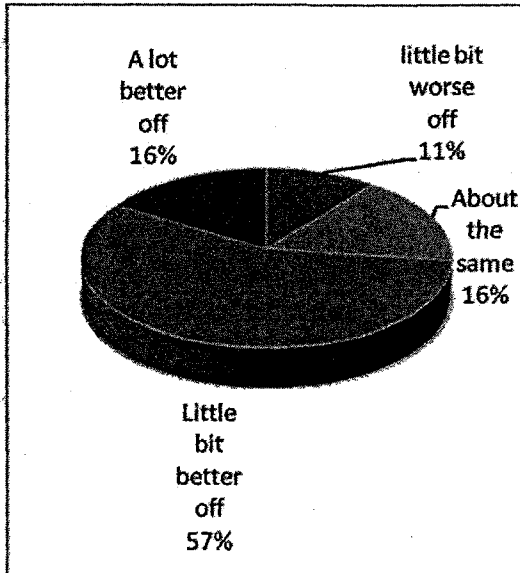
b) Change in happiness of treatment partners
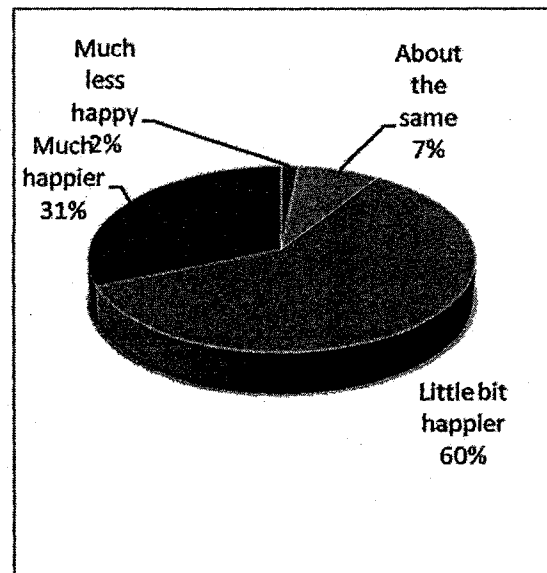
Note: No response categories, "much worse off" and "little bit less happy", are not included in the pie charts.

c) Change in happiness of patients
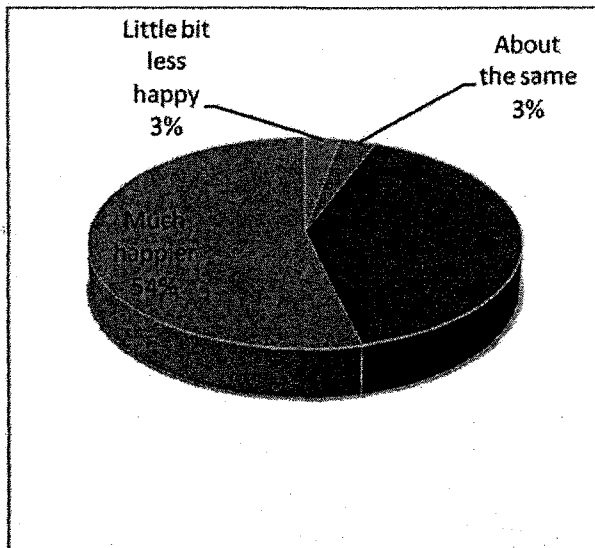
Note: No response category, "much less happy", are not included in the pie chart.

For change in living standard, 73 percent of the respondents reported positive change. For the change in happiness measures, over 90 percent reported positive change. Patient happiness had the largest proportion indicating "much happier" at 54 percent.

5.1 Regression results

As described in chapter 4, three models were estimated (equation 4.1, 4.2 and 4.3). The estimation results and the marginal effects of the three models (Ordered probit models) are shown in Tables 5.3 to 5. 5.

5.1.1 Model 1: Changes in living standard

Table 5.3 presents the results for model 1 which investigates determinants of change in household living standard.

Overall the model performed well. The overall chi-square for the model is highly statistically significant. For this model, five independent variables are found to be statistically significant at greater than the 10% level. All significant variables have the expected signs except age of household head.

The age of the household head (*agehhh*) is negatively related to changes in living standard (p <0.01). Age of the patient was dropped from the regression to avoid collinearity, as a majority of patients in the sample are also household heads.

Table 5.3 Results of ordered probit for change in household living standard

Variables	Coefficients	Marginal Effects – (Outcome 2)	Marginal Effects – (Outcome 3)	Marginal Effect – (Outcome 4)	Marginal Effects – (Outcome 5)
Agehhh	-0.585***	0.0658**	0.1113***	-0.065	-0.1121***
	(-4.02)				
femalep	0.726**	-0.0968	-0.1349**	0.1058	0.1259**
	(2.11)				
Edup	0.045	-0.0051	-0.0085	0.005	0.0086
	(0.27)				
Adults	0.448***	-0.0505**	-0.0853**	0.0498	0.0860***
	(2.88)				
$\Delta CD4$	0.017	-0.0019	-0.0032	0.0019	0.0032
	(0.14)				
netsaving	0.453***	-0.0510**	-0.0862**	0.0503	0.0868***
	(3.50)				
diversity	-0.011	0.0012	0.002	-0.0012	-0.002
	(-0.08)				
employed	0.628*	-0.0547*	-0.1097**	0.0178	0.1466***
	(1.87)				

Log pseudo likelihood -65.343

Prob chi2   0.000

Pseudo R2   0.153

Notes: Coefficients are standardized, t-value in parentheses, *,**,*** indicates significance at the 10%, 5% and 1% level respectively. Outcome 1- a lot worse off (omitted because of no responses), Outcome 2- little bit worse off, outcome 3- about the same, Outcome 4- little bit better off, outcome 5 – much better of.

I had assumed that an increase in age of household head would increase household labour resources as patients get better because the majority of patients are household heads. However, the finding about the relationship between the age of the household head and changes in living standard indicate its negative impact.

Since one cannot directly interpret the magnitude of the impact from the coefficient estimates, I calculated the marginal effects, as defined in chapter 4, and the results are indicated in table 5.3 columns three through six. Marginal effects are calculated for each outcome (outcome 2 through 5). The marginal effects presented above should be interpreted carefully. For example, results indicate that for an increase of 9.5 years (i.e. one standard deviation) in the average age of the household head (41 years) the probability of respondents reporting the "much better off" outcome (i.e., outcome 5) decreases by 11 percent holding other variable constant at their means. Moreover, the probability of reporting the "little bit worse off" outcome (i.e. outcome 2) increases by 6.6 percent with a 9.5 years increase. Although I hypothesized a positive effect of age of household, it could be that as patients gets better; this increases to less productive age group.

Being a female patient has a positive effect ($p< 0.05$) on the change in living standard. The marginal effect of female patient (*femalep*) on "much better off" is 0.126, which means that being female patient increases the probability of respondents reporting the "much better off" outcome by 12.6 percent.

In the case of the variable of number of adult members (*adults),* the coefficient is positive and statistical significant ($p < 0.01$). The marginal effect results suggest that an

increase of 1.8 adults (i.e. 1 standard deviation) results in the increase in probability of reporting the "much better off" outcome by 8.6 percent. Conversely, the probability of reporting a "little bit worse off" outcome decreasingly about 5.1 percent if a household has 1.8 more adults. This is in support of the hypothesis of the increased household labour resource availability as patients' health improves.

It is interesting to note that net savings (*netsaving*) has an estimated positive effect on changes in household living standard. When the average household net saving increases by 349,246 Ugandan shillings (i.e. 1 standard deviation), the probability of reporting the "much better off" outcome is estimated to rise by 8.7 percent, while the "little bit worse off" and "about the same" outcome probabilities fall by 5.1 and 9.0 percent, respectively.

Results show that the dummy variable for employment status (*employed*) is statistically significant at 10% level. The coefficient indicates indicate a positive influence on changes in living standards. The marginal effect of employed on "much better off" and "little bit worse off" are 0.147 and -0.055, suggesting that being employed increases the probability of reporting the "much better off" outcome by 14.7 percent and decreased the probability of reporting the "little bit worse off" outcome by 5.5 percent. This result suggests that being employed makes more financial resources available which may lead to increased productivity and thus increases household standards of living.

Other variables such as patient education, changes in CD4 ($\Delta CD4$) counts[3] and diversity index are not statistically significant. One explanation could be due to lack of degrees of freedom or variability in the data to identify the true effect.

5.1.2 Model 2: Changes in happiness of treatment partner

Table 5.4 presents the results for model 2 which investigates determinants of changes in happiness of treatment partners.

This model is statistically significant ($p < 0.01$), as seen from the chi-squared statistics. In this regression, the only significant variables found to explain changes in happiness of treatment partners are patient education (*edup*) and household net saving (*netsaving*), which are significant at 1% level. Patient education has the expected sign while I had no prior sign for net savings.

Results indicate that patient education (*edup*) is positively related to changes in happiness of treatment partner. The marginal effect results indicate that for a 3.4 years increase in patient education, the probability of respondents reporting the "little bit happier" outcome (i.e., outcome 4) decreases by 10 percent, while the probability of reporting the "much happy" outcome increases by 16 percent. The positive relationship coincides with the conclusion of Veenhoven (1996) that education is highly correlated with satisfaction in low income countries.

---

[3] I have also tried testing specific categorical dummy variables (quintiles) for changes in CD4 counts. By omitting category 1 which is less change, none of the categories showed statistically significant results.

Table 5.4: Results of ordered probit for change in treatment partners' happiness

Independent variables	Coefficients	Marginal Effects - Outcome1	Marginal Effects - Outcome 3	Marginal Effect - Outcome 4	Marginal Effects - Outcome 5
Agetp	-0.009 (-0.05)	6.33E-05	0.001	0.0019	-0.003
Edup	0.463*** 3.11	-0.0033***	-0.0505***	-0.1019***	0.1557***
Minors	0.092 0.56	-0.0007	-0.0101	-0.0203	0.031
pensioners	-0.108 (-1.4)	0.0008	0.0117	0.0237	-0.0362
$\Delta CD4$	0.201 1.29	-0.0014	-0.0219	-0.0442	0.0675
netsaving	0.589*** 4.17	-0.0042***	-0.0643***	-0.1298***	0.1983***
Church	0.04 0.13	-0.0003	-0.0043	-0.0088	0.0134
Selfhelp	0.066 0.12	-0.0004	-0.007	-0.0152	0.0226
Log pseudo likelihood	-52.677				
Prob chi2	0.0001				
Pseudo R2	0.1528				

Notes: Coefficients standardized, t-value in parentheses, *,**,*** indicates significance at the 10%, 5% and 1% level respectively. Outcome 1 – much less happy, outcome 2- little bit less happy (omitted because of no responses), outcome3- about the same, Outcome 4- little bit happier, outcome5 – much happier

Household net savings (*netsaving*) has a positive effect on changes in happiness

of treatment partners. Results on the marginal effect of net saving show that for a 349,246

Ugandan shillings increase in household net savings, the probability of reporting the

"much happier" outcome increases by 20 percent and decreases the probability of

reporting the "much less happy", "about the same" and" little bit happier" outcomes by

0.4, 6.0 and 13.0 percent, respectively. This suggests that increased savings are positively

associated with reporting the highest increases in happiness of treatment partners.

Age of treatment partner (*agetp*), number of minors and pensioners and social

capital variables such a belonging to church and self-help associations are found to have

no significant impact on changes in happiness of treatment partners. However, number of

pensioners and changes in CD4 count[4] ($\Delta CD4$) are not significant. Increases in the

degrees of freedom may improve their significance. Though increases in the degrees of

freedom may improve their significance, for the CD4 count variable, the fact that most

respondents are better off and have improved CD4 counts make it hard to identify this

effect. I have also tried to run the regression without the changes in CD4 count, and

results did not change significantly (Appendix H). This means that changes in CD4 does

not play a significant role as a control variable.

---

[4] I have also tried testing specific categorical dummy variables (quintile groups) for changes in CD4
counts. By omitting category 1 which is less change, only category 5 was positive and significant at
25% level suggesting improvement in patient health makes treatment partners happier. However
this requires a large sample to improve the significance level.

5.1.3 Model 3: Changes in happiness of patient

Table 5.5 presents the results for model 3 which investigates determinants of changes in happiness of patients.

The overall performance for change in happiness of patients' model is quite good with chi-square significant at 1% level. Out of the eight independent variables investigated, four of the variables are found to be statistically significant. These variables are the number of children and pensioners in the households, net saving and church.

It is interesting to find that the number of children (*minors*) in a household is significantly positively related to patients' happiness ($p < 0.05$). The marginal effect results for minors indicate that an increase in the number of minors in the household by 1.1 increases the probability of respondent reporting the "much happier" outcome by 16.7 percent and decreases the probability of "little bit happier" by 15%. This finding suggests that household with more children appear to perceive patients to be happier.

In contrast, additional pensioners in a household (*pensioners)* have a negative effect on changes in happiness of patients. Results of the marginal effects indicate that for a 0.27 increase in number of pensioners, the probability of reporting the "much happier" outcome decreases by 41.8 percent. Conversely, the probability of reporting a "little bit happier" outcome increases by 38 percent. This implies that increased pensioners in the household are negatively associated with reporting the highest increases in patients' happiness.

Increased net savings (*netsaving*) increases the probability of reporting the highest increase in happiness of patient by 20.2 percent and decreases the probability of

Table 5.5 Results of ordered probit model for change in happiness of patients

Independent variables	Coefficients	Marginal Effects - Outcome 2	Marginal Effects - Outcome 3	Marginal Effect - Outcome 4	Marginal Effects - Outcome 5
Agep	-0.032 (-0.17)	1.17E-05	0.0010	0.0116	-0.0127
Edup	-0.138 (-0.85)	5.07E-05	0.0045	0.0504	-0.0549
Minors	0.419** (1.85)	-0.0002	-0.0136*	-0.1529**	0.1667**
pensioner	-1.050*** (-5.55)	0.0004	0.0341***	0.3835***	-0.4180***
ΔCD4	-0.002 (0.01)	7.12E-07	6.29E-05	0.0007	-0.0008
netsaving	0.508*** (3.16)	-0.0002	-0.0165**	-0.1855***	0.2022***
Church	1.089*** (2.73)	-0.0004	-0.0315	-0.3811***	0.4131***
Selfhelp	-0.171 (-0.28)	8.02E-05	0.0064	0.0609	-0.0674
Log pseudo likelihood	-43.713				
Prob chi2	0.000				
Pseudo R2	0.283				

Notes: Coefficients standardized, t-value in parentheses, *,**,*** indicates significance at the 10%, 5% and 1% level respectively. Outcome 1 – much less happy (omitted because of no response)-, outcome 2 little bit less happy, outcome3- about the same, Outcome 4- little bit happier, outcome5 – much happier

64

of respondents reporting "little bit happier" by 18 percent. Results are similar as in model 1 and 2 where household with higher net saving are likely to perceive changes in happiness of patients to be of "much happier".

It is interesting to find that belonging to church (*church*) has a positive effect on changes in happiness of patients. The marginal effect results indicate that belonging to church increases the probability of reporting a "much happier" outcome by 41.3 percent and decreases the probability of reporting a "little bit happier" by 38% percent.

Age of patient, patient education, change in CD4 count[5] and belonging to self help association do not matter to changes in happiness of patients. It is interesting to note that the coefficient of self help (*selfhelp*) has the opposite (negative) sign indicating a negative association of social capital and changes in happiness of patient and is statistically insignificant.

---

[5] This lack of significance persisted even when alternative specifications of change in CD4 count as a categorical variable were considered.

6. SUMMARY, CONCLUSIONS, POLICY IMPLICATIONS AND RECOMMEDATIONS

6.1 Introduction

This chapter presents a summary of the study and its results. Possible policy implications are then discussed. Finally, the limitations of the research are presented and areas for further research area proposed.

6.2 Summary

This thesis analyzed subjective well-being for HIV/AIDS rural households in Kabarole district, Uganda. The objective of the study was to assess how the subjective well-being of rural households has changed in response to HAART and investigate determinants of measures of subjective well-being. The main focus of the thesis was to investigate change in HIV/AIDS household living standard, change in happiness of treatment partners and change in happiness of patients as our measures of subjective well-being. The study was based on two secondary household data sets collected for HIV/AIDS households under a community based antiretroviral therapy pilot project in the rural Kabarole district of Uganda

Well-being measures were based on treatment partners' perceptions of change in subjective well-being after HIV/AIDS patients have been on ARV treatment for a year. The descriptive research findings revealed that there is significant positive change in

subjective well being as a result of HAART. Results show that about 73 percent of respondent gave a positive perception of changes in living standards. About 91 percent of the treatment partners indicated a positive perception of changes in their own happiness. Moreover, 94 percent gave a positive perception of changes in happiness of patients. These results indicate that people's lives in rural Uganda have improved as a result of HAART.

Furthermore, in order to understand better the determinants of changes in household living standards, change in happiness of treatment partners and change in happiness of patients happiness, regression analysis was used. Ordered probit models were employed in this study. The findings indicated that changes in living standards were positively influenced if the patient was a female, if a household was relatively wealthy in terms of net savings, if a household had more adults (i.e labour resources) and if anyone in the household had began working for wage.

The second regression model was estimated to investigate the determinants of changes in happiness of treatment partners. Changes in treatment partners happiness is influenced positively if the patient was highly educated and if the household was relatively wealthy in terms of net savings.

The third regression model investigated the determinants of changes in happiness of patients. Estimation results indicated that the more children there were in respondents' household the more likely the patient was happier. Moreover, minors, higher initial net saving and belonging to church have a positive impact on change in happiness of patients.

Though changes in living standard and changes in happiness are two distinct concepts with distinct determinants as suggested by theory, results indicate that both are influence positively by household net saving. Furthermore, although changes in happiness of treatment partner and changes in happiness of patients are similar concepts, apparently the effect of socio-economic factors are not the same for every individual. This could be because of different preferences and the value being put on certain things. These results are in support with the theory that different people might have different perceptions about their lives depending on their position and what is more important to them.

6.3 Policy Implications

It is important to note that investigating perceived livelihoods through subjective well-being outcomes is potentially an important undertaking. The ultimate goal of this analysis is informing efforts to improve well-being, by developing an understanding of peoples' perceptions of well-being as a result of HAART treatment. Although past studies have found HAART to provide health benefits, a more comprehensive investigation of the benefits of HAART should include impacts on broader well-being as well. Thus, this study is motivated by the need to look beyond health outcomes.

Some policy implications can be drawn from the analysis. In this thesis, the subjective well-being analysis suggests that providing HAART treatment to HIV/AIDS patients provides evidence that HAART has significant non-health benefits and has greatly improved peoples' well-being in rural Uganda. The findings outlined in this thesis may have direct implications for future policy targeted at improving peoples' well-being

and for potential expansion of HAART to households in similar circumstances. Thus policies that target improvement in well-being will be dependent on the factors that determine variations in subjective well-being. The policy decisions could be focused on subjective values placed on factors such as labour, education, household net saving, social organizational membership and employment. These factors provide numerous areas for policy influence and can therefore be considered before any uniform or blanket initiatives are implemented, if the objective of achieving improvements in well-being is to be met.

Specifically, this study has shown that HAART has a significant impact on subjective well-being. Nevertheless, absent a cure for HIV/AIDS, we are still faced with hundreds of infected individuals. In order to prevent the negative impact on household livelihoods, study results can be used to support scaling up HAART treatment to individuals with HIV/AIDS in rural Uganda, although much effect are likely to be constrained by treatment costs.

It is important to note that the impacts of HAART treatment are not only important for well-being, but they have potential policy implication for economic growth as well. The increase in household labour is a positive outcome and has implications for economic growth. Recovering from HIV/AIDS frees up time for caregivers who can attend to productive livelihood activities, resulting in increased labour productivity, and resultant economic benefits to both the household and society.

Since being employed is one of the main drivers of changes in living standard, the related challenge is to create wage labour opportunities to support the poor rural households. The policy implication is to identify policy interventions that promote non-

farm employment. Policies, for examples, that promote expansion of primary schools, road infrastructure and rural electrification may promote rural non-farm employment and increase rural wages thus leading to increased living standards.

Education is one of the main drivers of changes in happiness of treatment partners. Therefore expansion of primary school and equal access of education by all genders could make a difference in peoples' well-being.

Social capital is found to be the main determinant of changes in happiness of patient. The policy implication is to promote institutions that support community and social networking.

A consistent result is that net savings is a predictor of both change in living standard and change in happiness. Since crop production is the main livelihoods for the sampled households, there is a policy implication to strengthen rural household economy by putting more emphasis on agricultural inputs of production and commodity marketing accessibility. Often government interventions through research and extension services without marketing incentives fail. It is, therefore, recommended that government should deal with the small-scale farmers' barriers to the markets which can be done by improving rural road and formation of marketing cooperatives. These are likely to improve households' income.

6.4 Limitations and recommendation for further study

It is important to highlight some of the limitations of the study. Our sample of only 67 HIV/AIDS households was not ideal. In addition, there may also be omitted

variables that affect change in standards of living and change in happiness which may lead to biased estimates.

As a caution, it is important to note that subjective data analyzed in this study is the third-party perception of treatment partners, and not well-being as reported directly by the patients. Thus these results may have the limitations of being underestimation or overestimation of changes in happiness of patients.

Another important limitation concerns endogeneity. This study failed to implicitly model the relationship between changes in living standard and changes in happiness of treatment partners and changes in happiness of patients. These three measures of well-being are likely to be interrelated. Finding better instruments is therefore a challenging issue for further research. Fortunately, if time use data are made available, they can be potential instruments to use in further study.

Another potential extension of this work is the analysis of longer term impact of HAART on well-being after future rounds of surveys. This study was conducted after a year of treatment. Although it was shown that peoples' lives are improving, it is recommended that a longer period is important to have fully understand the impact of HAART on well- being changes and the determinants of variations in well-being changes. One possible extension of this work would be to take advantages of panel data, if made available, to take into account the fixed effect (non observed heterogeneity) and provide very useful insight into how people's well-being changed over time.

Finally, due to the limitations presented above, the result in this thesis could be interpreted as preliminary evidence on the change in well-being after initiating HAART

treatment. Specifically, more definite conclusions about the long run impact of HAART

on well-being require both a large sample and a longer time frame, say five years.

REFERENCES

Abdulai, A and A. CroleRees. 2001. Determinants of income diversification among rural households in southern Mali. *Food Policy* 26(4): 437 – 452.

Alexandrova, A. 2005.Subjective well-being and Kahneman's Objective Happiness. *Journal of Happiness Studies* 6(3):301-324.

Annual Health Sector Performance Report. 2007. Financial year 2006/2007. Uganda.

Argyle, M. 1999. Causes and correlates of happiness. In Kahneman D. *et al.* (eds). *Well-being: The foundation of hedonic psychology.* New York, Russel Sage Foundation.

Barnett, T., J. Tumashabe, G. Bantebya, R. Ssebuliba, J. Ngasongwa, D. Kapunga, M. Ndelike,M. Drinkwater, G. Nitti, and M. Haslwinimer. 1995. Field report: The social impact of HIV/AIDS on farming systems and livelihoods in rural Africa: Some experiences and lessons from Uganda, Tanzania and Zambia. *Journal of International Development* 7:163-176.

Barrett, C. B., M. Bezuneh and A. Aboud. 2001. Income diversification, poverty traps and policy shocks in Cote d'Ivoire and Kenya. *Food Policy*: 26: 367-384.

Beegle, K. 2003. Labour Effects of Adult Mortality in Tanzanian Households. Development Research Group, World Bank.

Blanchflower, D.G and A.J. Oswald. 2003. Well-being over time in Britain and the USA. *Journal of Public Economics* 88(7): 1359-1386.

Bryceson, D and L. Banks. 2000. End of an era: Africa's development policy parallax. *Journal of Contemporary African Studies* 19(1): 5 – 25.

Clark, A.E. & Oswald, A.J. 1996. Satisfaction and comparison income. *Journal of Public Economics* 61: 359-381.

Clark, A.E. and A.J. Oswald, 1994. Unhappiness and unemployment. *The Economic Journal* 104(424): 648-659.

Coutinho A, 2004. Capturing the HIV/AIDS epidemic. *The Lancet* 364 (9449): 1929-1930.

Diener, E. 1984. Subjective well-being. *Psychological Bulletin* 95: 542-575.

Diener, E. 2005. Guidelines for National Indicators of Subjective well-being and ill-being. University of Illinois.

Diener, E. and C. Scollon. 2003. Subjective well-being is desirable, but not the Summum Bonum. Paper presented at the University of Minnesota Interdisciplinary Workshop on Well-Being, Minneapolis.

Diener, E. and E.M. Suh. 1997. Measuring quality of life: economic, social and subjective indicators. *Social Indicators Research* 40: 189 – 216.

Diener, E., E.M. Suh and S. Oish.1997. Recent findings on subjective well-being. *Indian Journal of Clinical Psychologlst* 24:25-44.

Diener,E., E.M. Suh, R. Lucas, and H.L. Smith. 1999. Subjective well-being: Three decades of progress. *Psychological Bulletin* 125: 276 – 303.

Uganda Communication Commission. 2003. District information Portal, Kabarole district. *hht://www.kabarole.go.ug/background/index.htm*

Easterlin, R. A. 2001. Income and happiness: Towards a unified theory. *The Economic Journal* 111(473):465-484.

Ellis, F. 1998. Household strategies and rural livelihood diversification. *Journal of Development Studies* 35(1):1-38.

Ellis, F. 2000. *Rural Livelihoods and diversity in developing countries*, Oxford University Press, Oxford

Engh, I.E., L. Stloukal and J. du Guerny. 2000. HIV/AIDS in Namibia: The Impact on the livestock sector. Population Program Service, FAO Women and Population Division, FAO.

Fafchamps, M. and F. Shilpi. 2003. Subjective well-being, isolation and rivaly. Department of Economics, University of Oxford, Oxford.

Ferrer-i-Carbonell, A.. 2005. Income and well-being: An empirical analysis of the comparison income effect. *Journal of Public Economics* 89(5) 997-1019.

Frey, B. S. and A. Stutzer . 2004. Economic Consequences of Mispredicting Utility. Working Paper 218. University of Zurich: Institute for Empirical Research in Economics.

Frey, B. S. and A. Stutzer. 2002. What can economist learn from happiness research? *Journal of Economic Literature,* 40 (2): 402-35.

Frey, B. S., and A. Stutzer. 2000. Happiness, Economy and Institutions. *Economic Journal* 110: 918-938.

IRIN. 2008. Uganda: Factory to boost ARV rollout. Global HIV/AIDS and analysis, UN. *www.plusnews.org/report.aspx?ReportID=74715.*

Graham, C. 2005. Insights on development from the economics of happiness The World Bank Research Observer 20 (2): 201 – 231.

Graham, C. 2005. The economics of happiness: Insights on globalization from a novel approach. *World Economics* 6(3).

Green, W.H. 2003. *Econometric Analysis.* NY.Prentice Hall.

Helliwell, J. F. and H. Huang. 2005. How's the Job? Well-Being and Social Capital in the Workplace. NBER Working Paper No. 11759. Cambridge: National Bureau of Economic Research.

Helliwell, J. F. and R. D. Putnam. 2004. The social context of well-being. Phil Trans R. Soc Lon. B 359: 1435-46.

Helliwell, J. F.2007. Life satisfaction and quality of development. Plenary lecture for the international conference on comparative development in hournor of Platinum Jubilee of Indian statistical institute, Delhi.

Helliwell, John F. 2003. How's Life? Combining individual and national variables to explain subjective well-being. *Economic Modelling* 20(2): 331-60.

Herrera J., M. Razafindrakoto and F. Roubaund. 2006. The determinants of subjective poverty: A comparative Analysis between Madagascar and Peru.

Uyaphi .2008. Uganda Travel Guide. Uyaphi Safaris CC. *http://www.uyaphi.com/uganda/weather.htm).*

Jayne, T.S., M. Villarreali, P. Pingali and G. Hemrich. 2005. HIV/AIDS and the agricultural sector implication for policy in Eastern and Southern Africa. *Journal of Agricultural and Development Economics* 2 (2): 158 – 181.

Kahneman D., A.B. Krueger, D. Schkade, N. Schwarz and A.A. Stone. 2006. Would you be happier if you were richer? A focusing illusion. *Science* 312: 1908.

Kingdon, G. G. and J. Knight. 2006. Subjective well-being poverty versus income poverty and capabilities poverty? *Journal of Development Studies* 42(7): 1199-224.

Kinsey, B, K. Burger and J.W. Gunning. 1998. Coping with Drought in Zimbabwe: Survey Evidence on Responses of Rural households to risk. *World Development* 26(1): 89 - 110

Kipp, W., D. Tindyebwa, E. Karamagi and T. Rubaale. 2006. Measuring the burden of family caregivers of AIDS patients in Uganda (submitted to Journal of Transcultural Nursing).

Knight, J. and L. Song. 2006. Subjective well-being and its determinants in rural China. School of Sociology and Social Policy, Department of Economics, University of Nottingham.

Koenig, S. P., F. Leandre and P. E. Farmer. 2004. Scaling-up HIV Treatment Programmes in Resource-limited Settings: The Rural Haiti Experience. *AIDS 18*:21-25.

Kwaramba, P. 1997. The Socio-Economic Impact of AIDS on Commercial Agricultural Production Systems in Zimbabwe. Zimbabwe Farmer's Union and Friedrich Ebert Stiftung, Harare.

Laurent, C. et al. 2002. The Senegalese government's highly active anti retroviral therapy initiative: An 18- month follow-up study. *AIDS* 16 (10): 1363-70.

Lindsey, E., M. Hirschfeld and S. Tlou. 2003. Home-based caregiving in Botswana: experience of older women and young girls. *Health care for Women International* 24: 486 -501.

Lokshin, M, N. Umapathi and S. Paternostro. 2004. Robustness of subjective welfare analysis in poor developing country: Madagascar 2001.The World Bank, Washington D.C.

Long J.S. 1997.*Regresion Models for categorical and limited dependent variables: Advances quantitative techniques in the social science series.* SAGE publications. International Education and Professional Publisher. Thousand Oaks London New Delhi.

MacNeil, J.M. 1996. Use of culture care theory with Buganda women as AIDS caregivers. *Journal of Transcultural Nursing* 7(2), 14-20.

Macours, K. 2002. Comparing a direct with an indirect approach to collecting household level data: Who tells the truth? University of California, Berkeley. Department of Agricultural and Resource Economics.

Manosuthi, W et al. 2006. Survival rate and risk factors of mortality among HIV/tuberculosis – co-infected patient with and without antiretroviral therapy. *AIDS.* 43 (1):42-46.

Marins, J. R., L. F. Jamal, S.Y. Chen, M.B. Barros, E.S. Hudes, A.A. Babosa, P. Chequer, P.R. Teixeira and N. Hearst. 2003. "Dramatic Improvement in Survival Among Adult Brazilian AIDS patients." *AIDS* 17:1675-1682.

Masanjala W. 2007. The poverty - HIV/AIDS nexus in Africa: A livelihood approach. *Social Science and medicine* 64 (5): 1032 – 1041.

Maslow A H. 1943. A theory of human motivation. *Psychological Review* 50: 370 – 96.

Moghaddam M. 2008. Happiness, faith, Friends and Fortune- Empirical Evidence from the 1998 US survey data. *Journal of Happiness studies* 79(2):463-476.

Mpuga D. 2003. The official language Issue: A look at Uganda Experience. A paper presented at the African Language Research Project Summer Conference Ocean City, Maryland. Dunes Manor Hotel and Conference Center, Ocean City, Maryland.

Mutangadura, G. 2000. Household Welfare Impacts of Mortality of Adult Females in Zimbabwe: Implications for Policy and Program Development. Carolina Population Centre, University of North Carolina.

Muwanga, F.T. 2002. Impact of HIV/AIDS on agriculture and the private sector in Swaziland: The demographic, Social and Economic impact on subsistence agriculture commercial Agriculture, Ministry of Agriculture and Cooperatives and business. Swaziland.

Myers, D.B. and E. Diener. 1995. Who is happy? *Psychological Science* 6: 10-19.

Namazie, C. and P. Sanfey. 1999. Happiness in Transition: the Case of Kyrgyzstan, Distributional Analysis Research Programme Discussion Paper 40.

Nicoletti G and F. Pryor. 2001. Subjective and objective measures of the extent of governmental regulations. OECD, Economic Department.

Nkurunungi, J. B., J. Ganas, M.M. Robbins and G.B. Stanford. 2004. A comparison of two mountain gorilla habitats in Bwindi Impenetrable National Park, Uganda. *African Journal of Ecology* 42(4):289 – 297.

Olenja, J.M. 1999. Assessing community attitude towards home-based care for people with AIDS (PWAs) in Kenya. *Journal of Community Health*, 24(3):187-199.

Oswald, A. J.1997. Happiness and Economic Performance. *Economic Journal* 107:1815-1831

Powdthavee, N. 2006. Happiness and the standard of living: the case of South Africa. In; Bruno L. and Porta P.L 2007. *Handbook on Economics of Happiness*. Edward Elgar.

Ravallion, M. and M. Lokshin. 2001. Identifying warfare effects from subjective questions. *Economica* 68: 335 – 357.

Ravallion, M. and M. Lokshin. 2002. Self rated economic welfare in Russia. *European Economic Review* 46(8): 1453 -73.

Reardon, T., C. Delgado and P. Matlon. 1992. Determinants and effects of income diversification among farm households of Burkina Faso. The Journal of Development Studies 28(2): 264 -296.

Reardon, T., K. Stamoulis, A. Balisacan, M.E. Cruz, J. Berdeue, and B. Banks. 1998. Rural nonfarm income in developing countries: In the State of Food and Agriculture 1998,.Food and Agriculture Organization of the United Nations, Rome.

Robinson, E., N. Ansell, U.S. Huber, W.T. Gould and L. van Blerk. 2006. Young caregivers in the context of the HIV/AIDS pandemic in sub-Saharan Africa. *Population, Space and Place* 12(2) 93-111

Rosenzweig, M. and H. Binswanger. 1993. Wealth, weather risk and the composition and profitability of agricultural investment. *Economic Journal* 103:56-78.

Royo, G. M. and J. Velazco. 2005. Exploring the relationship between happiness, objective and subjective well-being: Evidence from rural Thailand. ESRC Research Group on well-being in developing countries, University of Bath, Great Britain.

Rugalema, G, S. Weigang and J. Mbwika. 1999. HIV/AIDS and the commercial agricultural sector of Kenya: Impact, vulnerability, sustainability and coping strategies. FAO and UNDP, Rome.

Rugalema, G.1999. HIV/AIDS and the Commercial Agricultural Sector of Kenya: Impact, Vulnerability, Susceptibility and Coping Strategies. FAO, Rome.

Singh R. 2002. Socio-economic problem of persons living with HIV/AIDS: A study in Mumbai, India. International conference on AIDS.

Stokes, C.S. 2003. Measuring Impacts of HIV/AIDS on Rural Livelihoods and Food Security. Population and Development Services, FAO Gender and Population Division, FAO.

Strauss, J and D. Thomas. 1998. Health, Nutrition, and Economic Development. *Journal of Economic Literature* 36(2): 766-817.

Sy, H. A., M D., Faminow, G V., Johnson and G. Crow. 1997. Strauss, J and D. Thomas. 1998. Estimating the value of cattle using an ordered probit model. *American Journal of Agricultural Economics* 79 (2): 463 – 476.

The Social Report. 2007. Economic standard of living. Ministry of Social Development, New Zealand

Thirumurthy, H., J.G. Zivin, and M. Goldstein. 2006. The economic impact of AIDS treatment: Labor supply in western Kenya. Economic Growth Center, Yale University, Center Discussion paper No. 947.

Tirelli, U. and D. Bernardi. 2001. Impact of HAART on the clinical management of AIDS- related cancers. *European Journal of Cancer* 37(10): 1320 – 1324.

Topouzis, D., and J. du Guerny 1999. Sustainable Agricultural/Rural Development and Vulnerability to the AIDS Epidemic. UNAIDS and Food and Agriculture Organization (FAO), Rome.

Uganda Bureau of Statistics (UBOS).2002. The 2002 Uganda population and housing census– main report. Kampala, UBOS.

UNAIDS. 2006. Report on the Global AIDS epidemic. Geneva: Joint United Nations Programme on HIV/AIDS.

UNAIDS. 2007. AIDS epidemic update. Geneva: Joint United Nations programme on HIV/AIDS

USAID. 2005. Policy guidelines: Mitigating the development impact of HIV/AIDS. US Agency for international development.

Van Aardt, C. J. 2008. Determining the predictors of living standard in South Africa" A real world econometric approach. Sabinet online.

Van Praag, P. and P. Frijters. 1999. The measurement of welfare and well-being: The Leyden approach. School of Economics and Finance, Queensland University of Technology.

Van Praag, P. Frijters and A. Ferrer-i-Carbonell. 2000. A structural Model of well-being: with application to German data. Tinbergen Institute Discussion paper, University of Amsterdam.

Veenhoven, R. 1996. Happy life expectancy; A comprehensive measure of quality-of-life in nations. *Social Indicators research* 39: 1-58

Veenhoven, R. 1997. Advances in understanding happiness. Erasmus University Rotterdam and University of Utrecht, The Netherlands.

Wassmer, R.W, E.L. Lascher and S. Kroll. 2008. Sub-National Fiscal Activity as a determinant of individual happiness: Ideology Matters. Department of Public Policy and Administration, California State University, Sacramento.

Wools-Kaloustian, K., S. Kimaiyo, L. Diero, A. Siika, J. Sidle, C.T, Yiannoutsos, B. Einterz, K.H Fife and W. M. Tierney. 2006. Viability and Effectiveness of Large-scale HIV Treatment Initiatives in Sub-Saharan Africa: Experience from Western Kenya *AIDS 20(1):41-48.*

World Bank. 2000. Can Africa Claim the 21st Century? Washington, D.C.

Yamano, T and T.S. Jayne. 2004. Measuring the impacts of working-age adult mortality on small-scale farm households in Kenya. *World Development* 32:91-119.

Yamano,T. and T.S Jayne. 2002. Measuring the impacts of prime-age adult death on rural households in Kenya. Tegemeo Working Paper 5.Tegemeo Institute of Agricultural Policy and Development: Nairobi.

APPENDIX A: MAP OF UGANDA
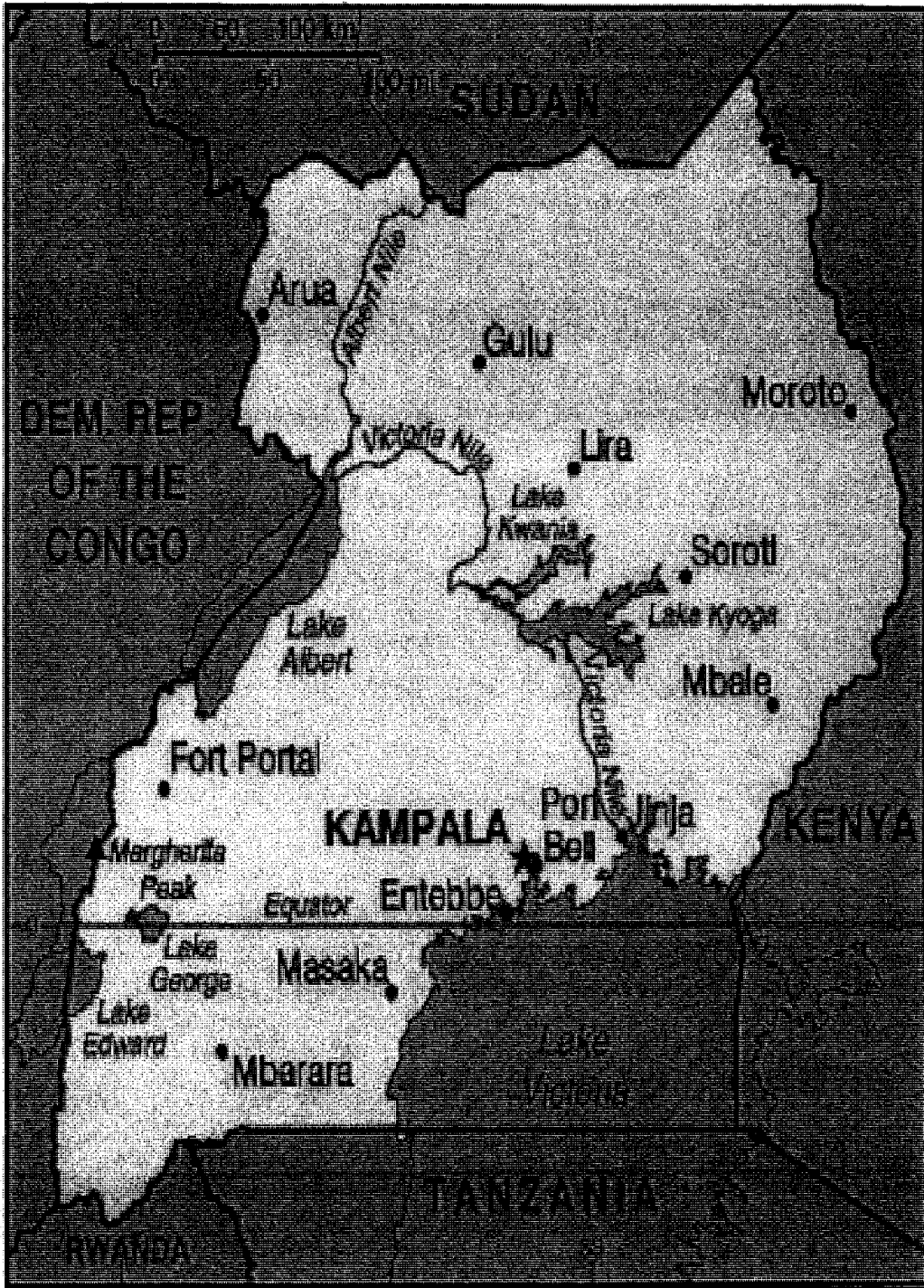
APPENDIX B: MAP OF KABAROLE DISTRIC
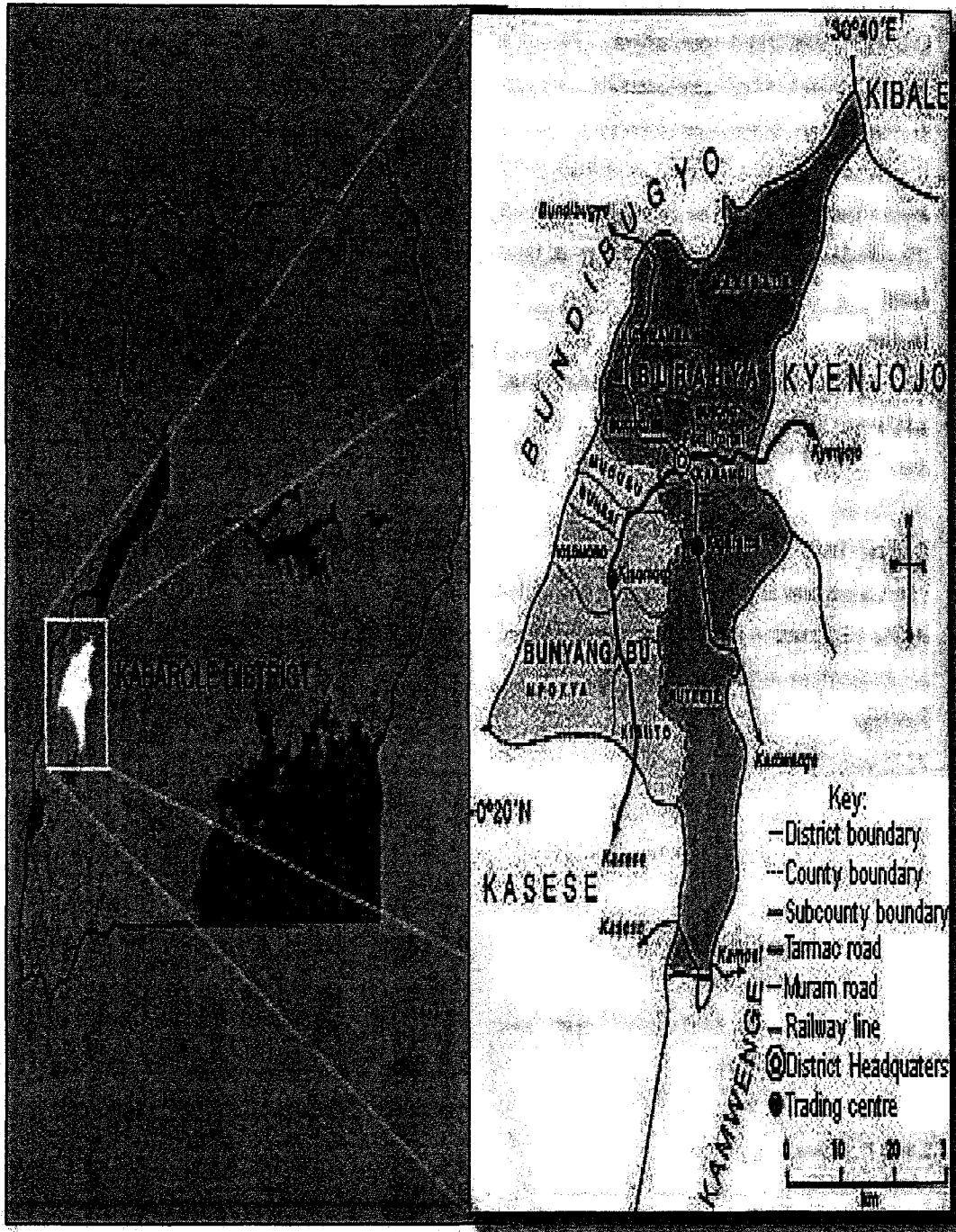
Source: Kabarole District Information Portal, 2007

APPENDIX C: HOUSEHOLD LIVELIHOOD QUESTIONNAIRE

Dialogue for the enumerator

(Enumerators will approach the residence, and will ask to speak with the head of the household when the door is opened)

-Good morning (afternoon), my name is... and I am a researcher with the Kabarole Research Centre in Fort Portal. I am here as part of the ARV study in which your household is participating. As you were told during your registration in the program, we are here to ask a number of questions about your household's activities. We are hoping we can spend about one hour speaking with you and members of your household. Is now a good time to speak with you?

(On subsequent visits: Say 45 minutes instead of one hour)

(If No:) May we come again at another time? (Record date and thank them for their time)

(If yes:) Thank you. (Proceed to survey)

Baseline household survey 1 (A1)

Control information

Task	Date(s)	By who?	Status OK? If not, give comments
Interview			
Checking questionnaire			
Coding questionnaire			
Entering data			
Checking & approving data entry			

A. Identification

1. Identification and location of household.

Household number		
Village	*(name)	(village ##)
Name and PID (see B. below) of household head	*(name)	(PID)
Name and PID (see B. below) of patient *(may be same as above)*	*(name)	(PID)

B. Household composition

1. Who are the members of the household [Who regularly takes their meals together]?

1. Personal Identification number (PID)	* Name of household member	2. Relation to household head[1)]	3. Year born (yyyy)	4. Sex (male or female)	5. Education (number of years completed)
1		Household head			

6					
7					
8					
9					
10					
11					
12					
13					
14					

1) Codes: 1=spouse; 2 son/daughter; 3=son/daughter in law; 4=grandchild; 5=mother/father; 6=mother/father in law; 7=brother or sister; 8=brother/sister in law; 9=uncle/aunt; 10=nephew/niece; 11=step/foster child; 12=other family; 13=not related.

6. What is the marital status of household head? ~~Codes: 1=married and living together; 2=married with spouse working~~ ~~away; 3=unmarried; 4=divorced; 5=never married; 6=other~~ ~~specify~~	

C. Land

1. Please indicate the amount of land (and specify the units) that you currently own and have rented in or out.

Category *Note: see definitions of land categories in definition sheet*	1. Area circle one: *ha / acre*	Main crops grown and/or harvested in the past 12 months Max 3 *(code-products)*		
		2. Rank1	3. Rank2	4. Rank3
1. Natural forest				

2. Managed forests				
3. Plantations				
4. Cropland				
5. Pasture (natural or planted)				
6. Agroforestry				
7. Silvipasture				
8. Fallow				
999. Other vegetation types/land uses (residential, bush, grassland, wetland, etc.)				
10. Total land owned (1+2+3+...+9)				
11. Land rented out (included in 1-9)				
12. Land rented in (not included in 1-9)				

D. Assets and savings

Note: These questions refer to the primary dwelling of the household.

1. Ownership of home (see codes below in note 1).	
2. What is the type of material of (most of) the walls? [2]	
3. What is the type of material of (most of) the roof ? [3]	
4. Approximate size of home (in square meters).	m^2

1) Codes: 0=do not have own home; 1=own the house on their own; 2=own the house together with other household(s); 3=renting the house alone; 4=renting the house with other household(s); 9=other, specify:

2) Codes: 1=mud/soil; 2=wooden (boards); 3=iron (or other metal) sheets; 4=bricks or concrete; 9=other, specify:

3) Codes: 1=thatch; 2=wooden (boards); 3=iron or other metal sheets; 4=tiles; 9=other, specify:

2. Please indicate the number and value of implements and other large household items that are owned by the household.

	1. No. of units owned	2. Total value (current sales value of all units, not purchasing price) *(UgShs. If asset not owned, put '0')*
Car/truck		
Tractor		
Motorcycle		
Bicycle		
Handphone/phone		
TV		
Radio		
Cassette/CD/ VHS/VCD/DVD/ player		
Stove for cooking (gas or electric only)		
10. Refrigerator/freezer		
12. Chainsaw		
13. Plough		
14. Cart or wheelbarrow		
16. Others (worth more than approx. 100,000 UgShs.)		

3. Please indicate the savings and debt the household has.

How much does the household have in savings in banks, credit associations or savings clubs?	*UgShs*
2. How much does the household have in outstanding debt?	*UgShs*

E. Forest resource base

How far is it from the house/homestead to the edge of the nearest natural or managed forest that you have access to and can use?	A. ... measured in terms of distance (straight line)?	km
	B. ... measured in terms of time (in minutes of walking)?	min

Does your household collect firewood? If 'no', go to 7.	(Yes/No)

If 'yes': how many hours per week do the members of your household spend on collecting firewood for family use?	(hours)

Does your household now spend more or less time on getting firewood than you did 5 years ago? (more, about the same, less)	

How has availability of firewood changed over the past 5 years? declined, about the same, increased If "about the same" or "increased," go to 7	

If declined (code '1' on the question above), how has the household responded to the decline in the availability of firewood? Please rank the most important responses, max 3.	Response	Rank 1-3
	Increased collection time (e.g., from further away from house)	
	Planting of trees on private land	
	Increased use of agricultural residues as fuel	
	Buying (more) fuelwood and/or charcoal	
	Buying (more) commercial fuels (kerosene, gas or electricity)	
	Reduced the need for use of fuels, such as using improved stove	
	9. Other, specify:	

Has your household planted any woodlots or trees on farm over the past 5 years? If 'no', go to next section.	(Yes/No)

If yes: what are the main purpose(s) of the trees planted? Please rank the most important purposes, max 3.	Purpose	Rank 1-3
	Firewood for domestic use	
	Firewood for sale	
	Fodder for own use	

	Fodder for sale	
	Timber/poles for own use	
	Timber/poles for sale	
	Other domestic uses	
	Other products for sale	
	9. Carbon sequestration	
	10. Other environmental services	
	19. Other, specify:	

F. HIV/AIDS knowledge questions

(Remember: The questions on this page are to be asked of the patient.)

Yes/No questions

Is AIDS spread by kissing?	Yes	No
Can a person get AIDS by sharing kitchens and bathrooms with someone with AIDS?	Yes	No
Can infected men give AIDS to women?	Yes	No
Can infected women give AIDS to men?	Yes	No
Must a person have many different partners to get AIDS?	Yes	No
Can you get AIDS by touching someone with AIDS?	Yes	No
Does washing after sex help protect against AIDS?	Yes	No
Is AIDS caused by spirits/supernatural forces?	Yes	No
Can a pregnant woman give AIDS to her baby?	Yes	No

Can a person get rid of AIDS by having sex with a virgin?   Yes   No

Is HIV the virus that causes AIDS?   Yes   No

Is there a cure for AIDS?   Yes   No

G. Health Care questions

1. The following are three types of health services. Please rank these services from most to least preferred (most preferred = 1, least preferred = 3).

_____ Traditional medicine

_____ Formal private health services

_____ Formal public health services

2. Please rank these services from most to least used (most used = 1, least used = 3).

_____ Traditional medicine

_____ Formal private health services

_____ Formal public health services

Please check that all questions in the baseline survey have been answered before you leave the household!

Please continue speaking with the household head as you continue on to the quarterly survey. If the household head is not the patient, make sure you return to sections F and G in the baseline survey (above) when you speak with the patient.

Enumerator Comments:

Quarterly household survey (Q1)

Control information

Task	Date(s)	By who?	Status OK? If not, give comments
Interview			
Checking questionnaire			
Coding questionnaire			
Entering data			
Checking & approving data entry			

A. Identification

Household number		
Village	*(name)	(village ##)
Name and PID of household head	*(name)	(PID)
Name and PID of adult male (for parts B and C)	*(name)	(PID)
Name and PID of adult female (for parts D and E)	*(name)	(PID)
Name and PID of child (for parts F and G)	*(name)	(PID)
Name and PID of patient	*(name)	(PID)

Personal identification numbers (PIDs) should be the same as used in the baseline survey.

*** *Note that the patient MUST be one of the respondents in lines 4 through 6 above, i.e., you MUST ask the patient the expenditure and time use questions.*

This means that in some cases you may not be asking expenditures and time use for the household head (for example, when an adult male other than the male household head is the patient).

The child respondent should be any child between the ages of 10 and 15 that is readily available. When possible, the same child should be interviewed in subsequent quarterly surveys.

I Questions for individual household members

B. Adult Male – Cash Expenditures

*** RECORD PID NUMBER OF ADULT MALE RESPONDENT _____

We are trying to understand how you spend your cash on a weekly basis.

The following questions are with regards to purchases over the last week.

That is between _____ and _____ .

What expenditures (cash spent on goods and services) have you made over the last week?

Expenditures	Code	Date	Amount spent

C. Adult Male – Time Use

We are trying to understand how you spend your time from the time you wake to the time you go to bed. Could you describe what you did yesterday?

Activity	Code	Time begun	Time end	Total Time

Total Time				

D. Adult Female – Cash Expenditures

*** RECORD PID NUMBER OF ADULT FEMALE RESPONDENT _____

We are trying to understand how you spend your cash on a weekly basis.

The following questions are with regards to purchases over the last week.

That is between _____ and _____ .

What expenditures (cash spent on goods and services) have you made over the last week?

Expenditures		Date	Amount spent

E. Adult Female – Time Use

We are trying to understand how you spend your time from the time you wake to the time you go to bed. Could you describe what you did yesterday?

Activity		Time begun	Time end	Total Time

Total Time				

F. Child – Cash Expenditures

*** RECORD PID NUMBER OF CHILD RESPONDENT _____

We are trying to understand how you spend your cash on a weekly basis.

The following questions are with regards to purchases over the last week.

That is between _____ and _____ .

What expenditures (cash spent on goods and services) have you made over the last week?

Expenditures		Date	Amount spent

G. Child – Time Use

We are trying to understand how you spend your time from the time you wake to the time you go to bed. Could you describe what you did yesterday?

Activity		Time begun	Time end	Total Time

Total Time				

H. Patient Questions about visit with Patient Partner

In the past week, did you travel away from your home to meet your patient partner?

___ YES   ___ NO

If YES, answer questions 2 through 5 and then continue. If NO, continue to next page.

How often in the last week did you meet your patient partner away from your home? ____
(number of meetings)

Time spent traveling to visit patient partner: _____ (minutes one way per trip)

Distance from patient to patient partner __ KM

Most frequent mode of travel to visit patient partner:

___ Walk

___ Bicycle

___ Bus

___ Motorcycle (boda)

___ Taxi

___ Car

___ Other (Please specify: _____)

II Questions about the Whole Household (to be asked of the household head)

I. Collection and/or use of unprocessed ("raw") forest products

1. What are the quantities and values of raw-material forest products the members of your household collected for both own use and sale over the past month?

1. Forest product (code-product)	2. Collected by whom?[1)	Collected where?		6. Unit	7. Quantity for own use (incl. gifts)	8. Quantity for sale or barter	9. Price per unit if sold	10. Type of market	12. Cost of transport and/or marketing (total)	13. Cost of Purchased inputs and hired labour (total)
		3. Land type *(natural forest, managed forest, or plantation)*	4. Ownership *(state, community, or private)*							

1) Codes: 1=only/mainly by wife and adult female household members; 2=both adult males and adult females participate about equally; 3=only/mainly by the husband and adult male household members; 4=only/mainly by girls (<15 years); 5=only/mainly by boys (<15 years); 6=only/mainly by children (<15 years), and boys and girls participate about equally; 7=all members of household participate equally; 8=none of the above alternatives.

J. Production of processed forest products

1. What are the quantities and values of processed forest products that the members of your household produced during the past month?

1. Product (code-product)	2. Who in the household did the work?[1]	4. Unit of processed product	5. Quantity for own use (incl. gifts)	6. Quantity for sale or barter	7. Price per unit if sold	8. Type of market	10. Cost of purchased inputs and hired labour	11. Cost of trans-port and/or marketing

1) Codes: 1=only/mainly by wife and adult female household members; 2=both adult males and adult females participate about equally; 3=only/mainly by the husband and adult male household members; 4=only/mainly by girls (<15 years); 5=only/mainly by boys (<15 years); 6=only/mainly by children (<15 years), and boys and girls participate about equally; 7=all members of household participate equally; 8=none of the above alternatives.

2. What are the quantities and values of *unprocessed* forest products used as inputs to produce the *processed* forest products in the table above?

Note: The products in column 1 should be exactly the same as those in column 1 in the table above.

1. Processed (final) products *(code-product)*	2. Unpro-cessed forest product used as input *(code-product)*	4. Unit of input/raw material	5. Quantity purchased	6. Quantity collected by household	Collected where?		9. Who in the household collected the forest product?	10. Price per unit if purchased
					7. Land type *(natural forest, managed forest, plantation)*	8. Ownership *(state, community, private)*		

1) Codes as in the table above.

Note: Columns 7,8,9 should be left blank if no collection by household. Column 10 (price) should be asked even if only from collection, but if not available, see the Technical Guidelines on valuation.

K. Fishing and aquaculture

1. How much fish did your household catch exclusively from the wild (rivers, lake, sea) during the past month?

| Type of fish (list local names) | Collected where? | | 4. Quantity for own use (incl. gifts) in kg. | 5. Quantity sold (including barter) in kg. | 6. Price per kg if sold | 8. Total costs (e.g., purchased inputs, hired labour, marketing) |
	2. Land type *(see note below)*	3. Ownership *(state, community, or private)*				

Note: Land types in column 2 may include natural forest, managed forest, plantation, cropland, pasture, agroforestry, silvipasture, fallow, or other

2. How much fish did your household catch from ponds (aquaculture) in the past month?

Type of fish (list local names)	1. From where? (see note below)	3. Quantity for own use (incl. gifts) in kg.	4. Quantity sold (including barter) in kg.	5. Price per kg if sold	7. Total costs (e.g., purchased inputs, hired labour, marketing)

Note: Possible answers include: 1=Pond owned by households; 2=Pond owned by group of which household is a member; 3=Pond owned by community/village; 4=Pond owned by others and persons can buy fishing rights (include costs in column 7); 9=Other, specify:

L. Wild Products (not from forests or fishing)

1. How much of other wild products (e.g., from grasslands, fallows, etc.) did your household collect in the past month?

1. Type of product *(code product)*	Collected where?		5. Unit	6. Quantity for own use (incl. gifts)	7. Quantity for sale or barter	8. Price per unit if sold	10. Total costs (e.g., purchased inputs, hired labour, marketing)
	2. Land type *(see note below)*	3. Ownership *(state, community, private)*					

Note: Land types in column 2 may include cropland, pasture, agroforestry, silvipasture, fallow, or other.

M. Wage income

1. Has any member of the household had paid work (i.e., paid in cash) over the past month?

Note: One person can be listed more than once for different jobs.

1. Household member (PID)	2. Type of work *(code-work)*	3. Days worked past month	4. Daily wage rate

104

N. Income from own business (not forest or agriculture)

1. Are you involved in any types of business, and if so, what are the gross income and costs related to that business over the past month?

Note: If the household is involved in several different types of business, you should fill in one column for each business.

	1. Business 1	2. Business 2	3. Business 3
What is your type of business? *(see note below)*			
Gross income (sales)			
Costs:			
Purchased inputs			
Own non-labour inputs (equivalent market value)			
Hired labour			
Transport and marketing cost			
Capital costs (repair, maintenance, etc.)			
Other costs			
10. Current value of capital stock			

Note: Responses may include 1=shop/trade; 2=agric. processing; 3=handicraft; 4=carpentry; 5=other forest based; 6=other skilled labour; 7=transport (car, boat,...); 8=lodging/restaurant; 19=other, specify:

*** Note that the following questions all refer to the PAST 3 MONTHS (not the past month).

O. Income from agriculture – crops

1. What are the quantities and values of crops that the household has harvested during the past 3 months?

1.Crops (code-product)	2. Area of production circle one: ha / acre	4. Unit	5.Quantity harvested for own use (incl. gifts)	6. Quantity harvested for sale (incl. barter)	7. Price per unit if sold

2. What are the quantities and values of purchased inputs used in crop production over the past 3 months?
Note: Take into account all the crops in the previous table.

Inputs	1. Quantity of input	2. Unit	3. Price per unit
Seeds			
Fertilizers			
Pesticides/herbicides			
Manure			
Draught power			
Hired labour			
Hired machinery			
Transport/marketing			
Other, specify:			
20. Total Payment for crop land rental:		*UgShs.*	

P. Income from livestock

1. What is the number of ADULT animals your household has now, and how many have you sold, bought, slaughtered, or lost during the past 3 months?

	1. How many do you have now?	2.How many sold (incl. barter) in past three months, live or slaughtered	3.How many slaughtered for own use (incl. gifts) in past three months?	4. How many have you lost in the past three months (theft, died,..)	5. How many have you bought or received in the past three months?	6. How many new adults from own stock in the last three months?	7. Average price per adult animal if bought or sold
Cattle							
Goats							
Sheep							
Pigs							
Donkeys							
Ducks							
Chicken							
19. Other, specify:							

2. What are the quantities and values of animal products and services that you have produced uring the past 3 months?

Product/service	2. Unit	3. Quantity produced for own use (incl. gifts)	4. Quantity produced for sale or barter	5. Price per unit if sold
Meat [1)]				
Milk				
Butter				
Cheese				

Ghee				
Eggs				
Hides and skin				
Wool				
Manure				
Draught power				
Other, specify				

1) Make sure this corresponds with the above table on sale and consumption of animals.

3. What are the quantities and values of purchased inputs used in livestock production during the past 3 months?

Inputs	Total Cost
Feed/fodder	
Rental of grazing land	
Medicines, vaccination and other veterinary services	
Costs of maintaining barns, enclosures, pens, etc.	
Hired labour	
Other, specify:	

Q. Other income sources

1. Please list any other income that the household has received during the past 3 months.

Type of income	Total amount received in the past three months
Remittances	

Support from government, NGO, organization or similar If yes, please specify name of support source:	
Gifts/support from friends and relatives	
Pension	
Payment for forest services	
Payment for renting out land (if in kind, state the equivalent in cash)	
Other, specify:	

R. School Fees

1. How much have you paid in school fees for all household members in the past three months?
_____ *UgShs.*

ENUMERATOR COMMENTS:

APPENDIX D: PERCEPTION SURVEY QUESTIONNAIRE

Treatment Partner Survey – *CORESIDENT TPS* **– Kabarole 2007**

Name of respondent: *[Respondent Name]*

Respondent Number: *[Respondent Number]*

Name of respondent's client: *[Client Name]*

Client's HAART ID number: *[Client HAART Number]*

Client is respondent's: *[Client Relationship]*

1. Husband
2. Wife
3. Son
4. Daughter
5. Father
6. Mother
7. Brother
8. Sister
9. Other family members *[Other family members]* (please specify
10. Members of spouse's family *[Spouse's family]* (please specify)
11. Friend or neighbor
12. Other, please specify *[Other relationship]*

How long respondent has been the client's Treatment Partner: *[Partner Time Length]*
Name of Interviewer: *[Interviewer Name]*
Date of Interview: *[Date of Interview]*
Time of Interview: *[Time of Interview]*
Location of Interview: *[Location of Interview]*

A. Introductory questions

1. Many of these questions ask you to compare your life today with your life at the time you were interviewed last year. Do you remember the time you were interviewed last year? (Pa)
[Remember Last Interview]

    1. Yes
    2. No (go to question B1)

3. New Treatment partner – was not interviewed previously (go to question B1)

2. Do you remember the name of the person who interviewed you? (Pa)
[Remember Last Interviewer]
    1. Yes. His/her name was **[Last interviewer name]**
    2. No.

3. Last year, you said that you stayed with your client. Do you still stay with your client? (Pr)
[Live with Client]
    1. Yes
    2. No

B. Status of patient

1. How often did you see the client last week? (please circle *one*) (Pa)
[Client Visit Frequency]
    1. Every day
    2. Several times, but not every day
    3. Once
    4. I did not see the patient last week, but I saw them in the last month
    5. Other, **please specify** **[Other frequency]**

2. How would you describe your client's general health at the last time you saw them? (please circle *one*) (Pa)
[Last Visit Client Health]

    1. He or she is very healthy
    2. He or she does not feel well but can continue all of his or her everyday activities
    3. He or she does not feel well and has to stop some of his or her everyday activities
    4. He or she is very sick and cannot do any of his or her everyday activities
    5. Other, **please specify** **[Other past client health]**

3. Compared to when you started as a treatment parner, how would you describe your client's general health? (please circle *one*) (Pa-Pr)
[Pa-Pr Client Health]
    1. He or she is much better.
    2. He or she is a little bit better.
    3. He or she is about the same.
    4. He or she is a little bit worse.
    5. He or she is a lot worse.
    6. Other, **please specify** **[Other Pa-Pr client health]**

4. How does your client contribute to the household <u>at the present time</u>? (please circle *all that apply*). (Pr)
(1=yes, 2=no)

A. Digs in the garden. *[Client Digs in Garden]*
B. Prepares meals. *[Client Prepares Meals]*
C. Cares for children. *[Client Cares for Children]*
D. Cleans the house. *[Client Cleans House]*
E. Sells things. *[Client Sells Things]* What things? *[Sells what things]*_____
F. Works full-time for money. *[Client Works Full time]* What kind of job? *[Full time job]*
G. Works part-time for money. *[Client Words Part time]* What kind of jobs?_ *[Part time job]*
H. Other, *[Other contribution]* please specify_*[Other contribution specify]*

5. At the time you started as a treatment partner, was your client able to do those things at that time? (Pa)
[Past Contribution]

1. Yes, s/he did all of those things.
2. S/he did some of those things but not all of them. Which ones did your client **not** do last year when we interviewed you? *[Things not able to do Pa]*
3. No, s/he did not do any of those things.

6. Compared to the time when you started as a treatment partner, how would you describe your client's happiness? (please circle *one*) (Pa-Pr)
[Happiness Pa-Pr]

1. S/he is much happier than last year.
2. S/he is a little bit happier than last year.
3. S/he is about the same as last year in terms of happiness.
4. S/he is a little bit less happy happier than last year.
5. S/he is much less happy than last year.
6. Other, please specify *[Other Pa-Pr happiness]*

C. Being a treatment partner

1. What are the main responsibilities of a treatment partner? (please circle *all that apply*)
(1=yes, 2=no)

A. Go with the client to the clinic *[Partner Goes to Clinic]*
B. Observe the client taking his/her medicine twice a day *[Partner Observes twice per day]*
C. Observe the client taking his/her medicine once a day *[Partner Observes once per day]*
D. Sign the client's card every day *[Partner Signs Card every day]*
E. Visit the client every week *[Partner Visits every week]*

F. Assist the client if s/her has side effects to the medicine *[Partner Assists with Side Effects]*

G. Report the cliebnt's health to the treatment volunteer *[Partner Reports Client's Health]*

H. Buy medicine for the client *[Partner buys Medicine]*

I. Other*[Partner does Other]*, please specify*[Other responsibilities]*

J. I don't know *[Partner doesn't know]*

2. Do you think that being a treatment partner is difficult?
[Difficult to Partner]

    1. Yes. Why? *[Why difficult]*

    2. No. Why? *[Why not difficult]*

D. Livelihood

1. How does your household get food? (please circle *one*)   (Pr)
[Acquiring Food

    1. We grow all our own food

    2. We grow most of our own food and we buy some of our own food

    3. We grow about half of our food and we buy about half of our food.

    4. We grow some of our own food and we buy most of our food.

    5. We buy all our own food.

    6. Other, please specify. *[Other acquiring food]*

2. How does your household get money for things like school fees and necessary items? (please circle *all that apply*) (Pr)
(1=yes, 2=no)

    A.   We sell crops or other products from our home and garden. *[Sell crops or home products]*

What do you sell? *[What do you sell]*

    B.   Some members of the household work for money.
[Some Members of Household Work]

Who (relation)?	What do they do?
[Who works 1]	*[What do they do 1]*
[Who works 2]	*[What do they do 2]*
[Who works 3]	*[What do they do 3]*

    B.   Friends/relatives assist us.
[Friends or Relatives Assist]

Who? (relation)
[Who assists 1]
[Who assists 2]
[Who assists 3]

C. Churches or NGOs assist us. *[Churches or NGOs Help]*

D. We get rent or other income from people who use our land. *[Rental or other Income]*

E. Other, *[Other Means of Acquiring Money]*please specify. *[Other acquire money]*

3. Compared to when you started as a treatment partner (alternatively, when your client started their treatment), how would you describe the living standard of your household? (please circle *one*) (Pa-Pr)
[Living Standard Pa-Pr]
1. We are a lot better off.
2. We are a little bit better off.
3. We are about the same.
4. We are a little bit worse off.
5. We are a lot worse off.
6. Other, **please specify** *[Other living standard]*

4. What are the main difficulties your household experiences in getting food and money to support itself? (please circle *up to four*).
(1=yes, 2=no)

A. Not enough land to grow crops. *[Not Enough Land to Grow Crops]*
B. Lack of inputs (fertilizer, seeds, pesticides). *[Lack of Inputs]*
C. Lack of transport to market. *[Lack of Transportation to Markets]*
D. Low prices for crops. *[Low Prices for Crops]*
E. Lack of credit. *[Lack of Credit]*
F. Not enough labour for growing food *[Not Enough Labour to Grow Food]*
G. Household members are sick and cannot work for money. *[Household Members are too Sick]*
H. Debt. *[Debt]*
I. No one is employed. *[Unemployment]*
J. Not enough credentials to get employment. *[No Credentials for Employment]*
K. Low wages. *[Low Wages]*
L. Property-grabbing. *[Property Grabbing]*
M. Money is spent on other things. *[Money Spent on other things]* What other things? *[What other things is money spent on]*
N. Other *[Other difficulties in Getting Food and Money]*– please specify*[Other difficulties]*
O. We have no difficulties. *[Have no Difficulties]*

5. Have these difficulties gotten better or worse since you first started as a treatment partner? (please circle *one*) (Pa-Pr)
[Difficulties Change Pa-Pr]
1. Much better.
2. A bit better.
3. About the same.
4. A bit worse

5. Much worse.

6. Are there any members of the household who are attending school full time?

Who (relation)?	What is their age?
[Relationship 1]	*[Age 1]*
[Relationship 2]	*[Age 2]*
[Relationship 3]	*[Age 3]*

E. Psychosocial issues

1. Compared to when you started as a treatment partner, how would you describe your worries about the client? (please circle *one*) (Pa-Pr)
[Worries about Client]
    A. I am much more worried about the client.
    B. I am a little bit more worried about the client.
    C. I am worried about the same amount.
    D. I am a little bit less worried about the client.
    E. I am a lot less worried about the client.
    F. Other, *[Other worries level]* please specify

2. What are the things you are most worried about, including the client but also including other worries? (please circle *up to four*). (Pr)
(1=yes, 2=no)

    A. Lack of money *[Lack of money]*
    B. Lack of food*[Worried about lack of food]*
    C. Lack of clothes or other necessary items*[Worried about lack of clothes or other necessary items]*
    D. Condition of home*[Worried about condition of home]*
    E. Own health. *[Worried about own health]* Please specify*[Worried about own health worries]*
    F. Health of other people in household. *[Worried about health of others in household]* Please specify *[Worried about other health worries]*
    G. Danger from thieves or criminals *[Worried about danger from theives or criminals]*
    H. Unemployment*[Worried about unemployment]*
    I. Failure at school*[Worried about failure at school]*
    J. Isolation from family or friends*[Worried about isolation from family or friends]*
    K. Jealousy from others*[Worried about jealousy from others]*
    L. I am not worried about anything*[Not worried about anything]*
    M. Other, *[Have other worries]* please specify *[Other worries]*

3. Compared to when you started as a treatment partner, how would you describe your general happiness? (please circle *one*) (Pa-Pr)

[Respondent Happiness]
1. I am much happier.
2. I am a little bit happier.
3. I am about the same in terms of happiness.
4. I am a little bit less happy.
5. I am much less happy.
6. Other, please specify *[Other happiness level]*

4. Compared to when you started as a treatment partner, how well do you get along with your client? (please circle *one*)
[How Well do you Get Along]
1. We get along much better than we did.
2. We get along a little bit better.
3. We get along about the same.
4. We get along a little bit worse.
5. We get along a lot worse.
6. Other, please specify. *[Other get along level]*

F. Household ecology

Comparing now to the time you started as a treatment partner; (Pa-Pr)

1. Has anyone in your household gotten married?
[Marriages]
1. Yes. Who (relation)? *[Who married]*
2. No.

2. Has anyone in your household gotten divorced?
[Divorces]
1. Yes. Who (relation)? _*[Who divorced]*
2. No.

3. Has anyone in your household had a child?
[Births]
1. Yes. Who (relation)? *[Who gave birth]*
2. No.

4. Has anyone in your household died?
[Deaths]
1. Yes. Who (relation)? *[Who died]* What was the cause of death?_ *[Cause of death]*
2. No.

5. Has anyone in your household moved away to another place to live?
[Moves]

1. Yes. Who (relation)?_ *[Who moved]* Why did they move away? *[Why moved]*
2. No.

6. Has anyone in your household begun working for wages?
[Began working for wages]
1. Yes. Who (relation)?_ *[Who works]* What job did they begin doing? *[Type of job]*
2. No.

7. Has any new person come to live in your household, other than a baby who was born?
[New household members]
1. Yes. Who (relation)? *[Who moved in]* Why did they come to live in your household?_ *[Why moved in]*
2. No.

8. Has anyone in your household completed a school certificate or diploma?
[Certificate or Diploma Completion]
1. Yes. Who (relation)?_ *[Who completed]* What certificate or diploma did they complete? *[What completed]*
2. No.

9. Has anyone in your household <u>started</u> schooling?
[Started Schooling]
1. Yes. Who (relation)?_ *[Who started]* What level of schooling did they start? *[What level started]*
2. No.

10. Has anyone in your household purchased a large or expensive item,?
[Purchased large item]
1. Yes. Who (relation)?_ *[Who purchased]* What was the item? *[What purchased]*
2. No.

11. Have there been any other big changes in your household?
[Other big changes]
1. Yes. What were the changes? *[What big changes]*
2. No.

G. Networks

1. In the past month, have you assisted anyone outside your household by (please circle *all that apply)*
(1=yes, 2=no)

    A. Giving someone money for transport, medical costs or school fees. *[Given someone money for transport, medical costs or school fees]*

B. Given someone money for another reason. *[Given someone money for other reason]*What was the reason? *[Why give money]*
C. Given someone food when they were hungry. *[Given someone food]*
D. Given someone household items, such as clothes. *[Given someone household items]*
E. Helped someone with gardening tasks, not for pay. *[Helped someone with gardening tasks]*
F. Helped someone with other household tasks, not for pay. *[Helped someone with other tasks]*
G. Assisted someone in other ways, *[Assisted someone in other way]*please specify*[Other assistance]*
H. I have not assisted anyone. *[Have not assisted anyone]*

2. In the past month, has anyone outside your household assisted you by (please circle *all that apply*)
(1=yes, 2=no)

A. Giving you money for transport, medical costs or school fees. *[Been given money for transport, medical costs or school fees]*
B. Given you money for another reason. *[Been given money for other reason]* What was the reason? *[Why been given money]*
C. Giving you food when you were hungry. *[Been given food]*
D. Giving you household items, such as clothes. *[Been given household items]*
E. What did they give you?_ *[What household items]*
F. Helping you with gardening tasks, not for pay. *[Received help with gardening tasks]*
G. Helping you with other household tasks, not for pay. [*Received help with other tasks]*
H. Assisted you in other ways. *[Been assisted someone in other way]*, please specify *[Other assistance from outside household]*
I. No one has given me any assistance. . *[Have not been assisted]*

3. In the past month, have you received a visit from anyone outside your household? *[Visits from Outside Household]*
    1. Yes. Who visited you? (List *up to four visitors – relation to the respondent*)
        1. *[Who visited 1]*
        2. *[Who visited 2]*
        3. *[Who visited 3]*
        4. *[Who visited 4]*
    2. No.

4. In the past month, have you visited the home of anyone else outside your household? *[Visits to Outside Household]*
    1. Yes. Who did you visit? (List *up to four visits – relation to the respondent*)

1. *[Who gone to visit 1]*
2. *[Who gone to visit 2]*
3. *[Who gone to visit 3]*
4. *[Who gone to visit 4]*

2. No.

5. In the past month, has anyone from your household gone to: (please circle *all that apply)*
(1=yes, 2=no)

    A. Church/mosque*[Church/Mosque Past Month]*
    B. A wedding*[Wedding Past Month]*
    C. A funeral*[Funeral Past Month]*
    D. An educational event*[Educational Event Past Month]*
    E. A meeting*[Meeting Past Month]*
    F. A work party*[Work Party Past Month]*

6. Do you belong to any of these organizations? (please circle *all that apply*)
(1=yes, 2=no)

    A. Church/mosque *[Belong to Church]*
    C. Development association *[Belong to Development Association]*
    D. Political organization *[Belong to Political Organization]*
    E. Cultural association *[Belong to Cultural Association]*
    F. Self-help association *[Belong to Self-Help Association]*
    G. Sports group *[Belong to Sports Group]*
    H. Other, *[Belong to Other Group]* please specify*[Other Group Name]*
    I. I do not belong to any organization *[Belong to no Organizations]*

H. ARVs

1. How much would you say you know about the ARV medication?
[ARV Knowledge]
    1. Nothing
    2. A little
    3. A lot

2. Compared to other people in your community, how much do you think you know about ARVs? (please circle *one*)
[Comparative ARV Knowledge]
    1. I know more than most people
    2. I know about as much as most people
    3. I know less than most people
    4. Don't know
    5. Other, please specify *[Other comparision level]*

3. In your opinion, how long should a patient take ARVs before s/he is cured of HIV?
(please circle *one*)
[Time to ARV Cure]
    1. One month.
    2. One year.
    3. Two years.
    4. Ten years.
    5. ARVs cannot cure HIV
    6. Don't know
    7. Other, **please specify** *[Other time to ARV cure]*

4. In your opinion, can a person who is taking ARVs infect another person with HIV through sex?
[ARV Infectivity Sex]
    1. Yes, a person who is taking ARVs can infect another person through sex.
    2. No, a person who is taking ARVs cannot infect another person.
    3. Don't know
    4. Other, **please explain** *[Other ARV infectivity sex]*

5. How many other people besides your patient do you know who have used ARVs?
[Number of people on ARV]
    1. 0
    2. 1-2
    3. 3-4
    4. 5-7
    5. 8 +

6. Have ARVs been helpful to these people? (please circle *one*)

[ARVs are Helpful]

    1. Yes, all of them have been helped by ARVs
    2. Some of them have been helped
    3. ARVs have not been helpful to these people
    4. Don't know
    5. Other, **please specify** *[Other helpful level]*

7. Have you heard of any other ARV programmes like this one, apart from this ARV Project?
    [ARV Programmes Known]
    1. Yes. Where? *[Where are programmes]* What program? *[What are programmes]*
    2. No.

I. Opinions about AIDS and HIV

1. Now I want to ask you about the opinions of your family, friends and neighbours and the people you know. Which of the following statements about people with AIDS is true for the people you know? (please circle *one*)
[Outside attitudes towards AIDS patients]
- 1.   Most people are sympathetic to people with AIDS
- 2.   Some people are sympathetic to people with AIDS
- 3.   Most people are not sympathetic to people with AIDS
- 4.   Most people do not have an opinion about people with AIDs
- 5.   Don't know
- 6.   Other, please specify *[Other outside attitudes towards patients]*

2. Which of the following statements about ARVs is true for the people you know? (please circle *one*)
[Outside attitudes towards ARVs]
- 1.   Most people believe ARVs are beneficial to people with AIDS
- 2.   Some people believe ARVs are beneficial to people with AIDS
- 3.   Most people do not believe ARVs are beneficial to people with AIDS
- 4.   Most people do not have an opinion about ARVs
- 5.   Don't know
- 6.   Other, please specify *[Other outside attitudes towards ARVs]*

3. Which of the following statements about this ARV programme is true for the people you know? (please circle *one*)
[Outside attitudes towards Programme]
- 1. Most people believe this programme is beneficial to the community
- 2. Some people believe this programme is beneficial
- 3. Most people do not believe this programme is beneficial to the community
- 4. Most people do not have an opinion about this programme
- 5. Other, please specify *[Other outside attitudes towards programme]*
- 6. Don't know

J. Conclusion

1. Is there anything else you would like to add to the questions which I have asked you?
[Any other comments]

2. When the survey was carried out (please circle *one*) :
[People Present for Interview]

a. The client was present
b. There were other people present, please specify_*[Other people present]*

Thank you very much for helping us with this research today.

(Enumerator's comments):

[Enumerator Comments]

APPENDIX E: BIVARIATE ORDERED PROBIT RESULTS

Simultaneous bivariate ordered probit results for changes in happiness of treatment partners and changes in household living standard

Wald chi2 (8)	16.920	
Log likelihood	-109.106	
Prob > chi2	0.031	

	Coefficient	t- stat
ΔHTP		
agetp	0.017	0.450
edup	0.542***	2.940
minors	0.030	0.560
pensioners	-0.023	-0.500
ΔCD4	0.194	1.270
netsaving	0.574***	3.350
church	0.203	0.640
selfhelp	-0.060	-0.480
ΔLS		
htp	0.327	0.660
agehhh	-0.123	-0.670
femalep	0.094	0.630
edup	-0.521***	-3.000
adults	0.109	0.670
ΔCD4	-0.168	-1.170
netsaving	-0.488**	-2.240
diversity	0.006	0.250
employed	0.051	0.550
/cut11	-2.613	-3.829
/cut12	-1.454	-1.962
/cut13	0.595	0.203
/cut21	1.233	-2.432
/cut22	1.375	-2.687
/cut23	1.716	-3.302
Rho	-0.994	
Log likelihood ratio test chi2 (1)	11.280	
Prob> chi2	0.001	

Simultaneous bivariate ordered probit results for changes in happiness of patients and changes in household living standard

Wald chi2 (8)	21.990	
Log likelihood	-103.236	
Prob > chi2	0.005	

	Coefficient	t- stat
ΔHP		
agetp	0.048	0.300
edup	-0.173	-1.030
minors	0.485***	2.920
pensioners	-0.991**	-2.400
ΔCD4Δ	0.023	0.140
netsaving	0.516**	2.320
church	1.272***	3.100
selfhelp	-0.028	-0.050
ΔLS		
ΔHP	1.820*	1.670
agehhh	-0.635***	-3.350
femalep	0.627*	1.730
edup	0.019	0.120
adults	0.679***	3.550
ΔCD4e	0.011	0.070
netsaving	0.245	1.160
diversity	0.115	0.750
employed	0.324	0.860
/cut11	-3.689	-6.609
/cut12	-1.820	-2.695
/cut13	0.567	0.089
/cut21	6.731	-2.444
/cut22	7.607	-1.588
/cut23	9.804	0.257
Rho	-0.558	
Log likelihood ratio test chi2 (1)	1.040	
Prob> chi2	0.309	

Simultaneous bivariate ordered probit results for changes in happiness of patients and changes in happiness of treatment partners

Wald chi2 (8)	39.230	
Log likelihood	-90.061	
Prob > chi2	0.000	

	Coefficient	t-stat
ΔHP		
agetp	0.040	0.300
edup	-0.113	-0.730
minors	0.310	2.090
pensioners	-1.035	-5.170
ΔCD4	-0.044	-0.310
netsaving	0.599	3.590
church	1.107	2.790
selfhelp	0.337	0.660
ΔHTP		
ΔHP	0.763	0.310
agep	0.095	0.310
edup	0.240	0.530
minors	-0.263	-1.200
pensioners	0.853	1.400
ΔCD4	0.079	0.430
netsaving	-0.353	-0.420
church	-0.930	-1.410
selfhelp	-0.206	-0.300
/cut11	-3.550	-5.250
/cut12	-2.338	-2.962
/cut13	0.496	0.126
/cut21	2.321	-12.495
/cut22	2.848	-15.307
/cut23	3.471	-18.663
Rho	-1.000	
Log likelihood ratio test chi2 (1)	8.86	
Prob >chi2	0.0029	

APPENDIX F: HOUSEHOLD CHARACTERISTICS

Summary Statistics of other household head characteristics

Household head characteristics	Mean	Standard Deviation	Minimum	Maximum
Gender (male)	49 %			
Education	4.0	3.5	0	15
Married	51%			
Single	49%			
Widower	36%			
Never married	10%			
Divorced	3%			

Summary statistics of household assets ownership

Assets	Mean	Standard deviation	Minimum	Maximum
Land holding				
Natural	0.02	0.09	0.00	0.50
Managed	0.03	0.14	0.00	1.00
Plantation	0.19	0.40	0.00	2.00
Crop	1.19	1.99	0.00	14.50
Pasture	0.07	0.21	0.00	1.00
Agroforestry	0.10	0.30	0.00	2.00
Silvicultural	0.01	0.07	0.00	0.50
Fallow	0.02	0.10	0.00	0.50
Others	0.13	0.39	0.00	2.50
Total land	1.75	2.09	0.00	15.00
Percent landless	13.40%			
Livestock				
Cows	0.27	1.10	0.00	6.00
Goats	0.93	1.50	0.00	7.00
Pig	0.10	0.40	0.00	2.00
Ducks	0.25	0.90	0.00	5.00
Chicken	2.93	3.60	0.00	12.00
Type of housing wall				
Mud soil	88.1%			
Wooden	1.5%			

Summary statistics of household assets ownership (continued)

Assets	Mean	Standard deviation	Minimum	Maximum
Bricks	10.4%			
Iron	0.0%			
Type of housing roof				
Thatch	4.5%			
Wooden	0.0%			
Iron	95.5%			
Tiles	0.0%			
Productive and luxury goods:				
Motor	3.0%			
Bicycle	30.0%			
Cart	0.0%			
Hand phone	9.0%			
TV	0.0%			
Radio	70.0%			
Cassette	5.0%			
Stove	3.0%			
Refrigerator	6.0%			

APPENDIX G: HOUSEHOLD INCOME SOURCES

Descriptive statistics for income share by activity and total household income

Income source	Mean (N = 67)	Standard Deviation	Minimum	Maximum
Livestock	0.10	0.16	0.00	0.80
Crop	0.51	0.32	0.00	1.00
Forestry	0.06	0.12	0.00	0.77
Forestry processing	0.00	0.01	0.00	0.05
Fishing	0.00	0.00	0.00	0.01
Wild	0.03	0.11	0.00	0.74
Wage	0.15	0.22	0.00	0.96
Business	0.10	0.23	0.00	0.88
Others	0.05	0.15	0.00	0.90
Total income (Ugshs)	476821.17	610467.17	18000.00	4314508.33

Income shares from different income activities
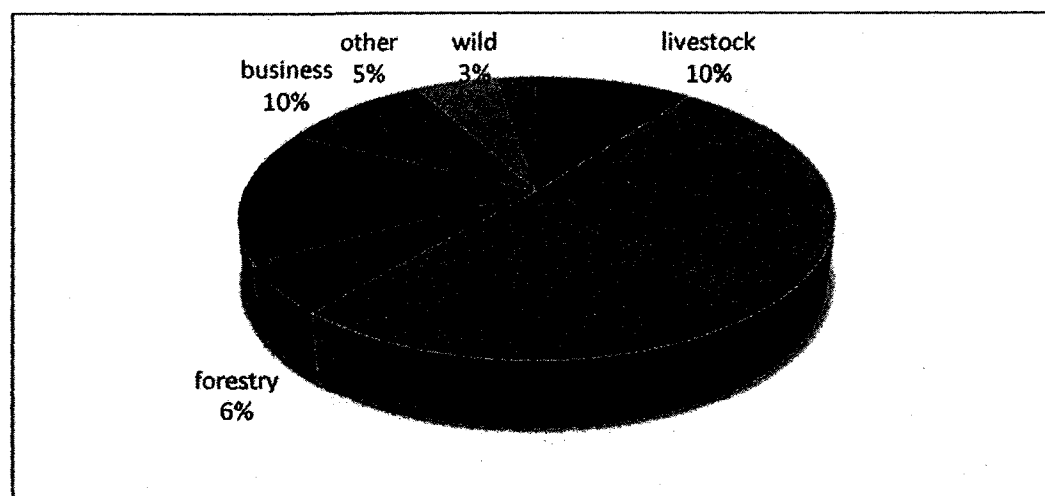
Note: Fishing and forestry processing contribute a very small percentage of 0.01% and 0.08%, respectively.

APPENDIX H: ORDERED PROBIT REGRESSION RESULTS

Changes in living standard

Variables	Coefficients	t-stat
agehhh	-0.582	-3.91
femalep	0.729	2.11
edup	0.047	0.28
adults	0.448	2.87
netsaving	0.454	3.57
diversity	-0.008	-0.06
employed	0.626	1.87
/cut1	-0.993	-1.69
/cut2	-0.145	-0.76
/cut3	1.807	1.12
Log pseudo likelihood	*-65.349*	
Pseudo R2	*0.153*	
Prob> chi 2	*0.000*	

Changes in happiness of treatment partners

Variables	Coefficients	t-stat
agetp	-0.002	-0.02
edup	0.471	3.12
minors	0.086	0.55
pensioner	-0.124	-1.66
netsaving	0.585	4.1
church	-0.085	-0.28
selfhelp	0.095	0.17
/cut1	-2.808	-3.29
/cut2	-1.562	-2.09
/cut3	0.554	0.16
Log pseudo likelihood	*-53.488*	
Pseudo R2	*0.140*	
Prob> chi 2	*0.000*	

Changes in happiness of patients

Variables	Coefficients	t-stat
agep	-0.032	-0.17
edup	-0.138	-0.86
minors	0.419	1.86
pensioner	-1.050	-5.54
netsaving	0.508	3.14
church	1.090	2.76
selfhelp	-0.171	-0.28
/cut1	-3.355	-4.90
/cut2	-1.851	-2.60
/cut3	0.456	0.03
Log pseudo likelihood	*-43.713*	
Pseudo R2	*0.283*	
Prob> chi 2	*0.000*	