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Impacts of HIV/AIDS on labor allocation and crop diversity: do stages of the disease matter?

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Impacts of HIV/AIDS on labor allocation and crop diversity: do stages of the disease matter?

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Abstract

This paper deals with the impact of HIV/AIDS on labor allocation and crop diversity. The study is based on an in-depth analysis of 4 case studies in Ethiopia. A novel element in the study is the emphasis on the distinction of various stages in which the disease affects families. Results show that impact on labor allocation very much depends on the various stages of the disease and which family member (or members) is affected. Also land tenure plays an important role, because of the options of having sharecropping contracts or opportunities for off-farm labour. This has implications for the intervention strategies in the various phases of the disease, both for men and women.

Key words: case study, crop diversity, Ethiopia, HIV/AIDS, labor organisation.

Running head: Impacts of HIV/AIDS

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Introduction

The HIV/AIDS pandemic affects the farming population through withdrawal of productive labor in various ways and increasing demand for cash expenses. Labor withdrawal is mainly through recurring illnesses, care-giving, death and migration. This is combined with an increase in health related cash expenses as well as the need to hire replacement labor. Consequently, farmers need to adapt to the changes caused by the pandemic. The short run responses include varying degrees of adjustment in the allocation of available labor and other resources across the alternative activities of the household. The manifestation of stress and subsequent response strategies varies depending upon household characteristics as well as the market environment outside the household. This motivates an empirical investigation to identify the impacts of HIV/AIDS on labor allocation and crop diversity in a specific setting by means of in-depth case studies.

There is some empirical evidence on the adjustments in farm household resource allocation patterns in response to HIV/AIDS pandemic. It is indicated that households under HIV/AIDS stress tend to reallocate labor towards non-agricultural activities that yield quick returns (Loevinsohn and Gillespie, 2003a) and divert labor from productive activities to increased care giving (Rugalema, 1999; Drimie, 2003; Loevinsohn and Gillespie, 2003a). As to the crop choice patterns, studies suggest a decrease in crop range through reducing area cultivated (Barnett and Whiteside, 2002), abandonment or underutilization of land (Shah, et al., 2001; Drimie, 2003; Loevinsohn and Gillespie, 2003a; Gillespie and Kadyala, 2005), favor for less labor demanding crops (Haddad and Gillespie, 2001) and production of food crops rather than cash crops following the death of a male household head (Yamano and Jayne, 2002). The studies give an insight into the diversity of implications to the response

strategies of the farm households under varying circumstances. The studies share the common characteristics of identifying an impact of HIV/AIDS either through in-depth studies of selected HIV/AIDS cases or through proxy indicators such as mortality and long term illnesses mainly in static context.

The objective of our paper is to identify the impact of HIV/AIDS on labor allocation patterns and crop choice and bio-diversity implications in a rural setting in Ethiopia. We focus on labor allocation and crop choice and diversity in response to HIV/AIDS, because they are fundamental determinants of the food and nutrition status of smallholder farm households. The allocation of male, female, and child labor to the various farm and off-farm activities is important for food and nutrition status as it influences the amount of income earned by the households. Similarly, crop choice and diversity are important for the food security status of the households due to their influence on the major consumption components as well as some income earnings. Various studies suggest that agro-biodiversity contributes to dietary diversity and nutrition (FAO, 2002; Gari, 2002; Johns, 2003) which is reinforced in the context of subsistence farm households who consume the major proportion of their production. In line with this, diversifying income sources (e.g., Gari, 2002) and risk management (e.g., Bardsley, 2003) are also identified as important roles of agro-biodiversity management. Bayush (1997) and Medhin (2003) also indicated that agro-biodiversity conservation is valuable for sustainability, income, and food security in the Ethiopian context. More importantly, nutrition is a fundamental health care component in the context of HIV/AIDS and nutritional access of individuals delays the progression of HIV into AIDS-related diseases (FAO, 2002; Gillespie, et al., 2001; Loevisohn and Gillespie, 2003a; Gillespie and Kadiyala, 2005).

The study is based on an in-depth analysis of four case studies on farm households. The analysis is founded on two basic hypotheses with regard to the short run implications of the pandemic to resource allocation patterns. The first hypothesis says that for a given affected household member, the implication to the household response strategies in terms of labor allocation, crop choice and diversity patterns are stage-sensitive. For this reason we conducted the analysis for each of the cases by paying attention to the developments over time through historical recollections. We, therefore, attempt to analyze responses for four stages identified as (i) *pre-illness*, (ii) *illness*, (iii) *death* and (iv) *current stage*. The second hypothesis asserts that labor allocation, crop choice and diversity implications of the pandemic are influenced by who in the household is (or are) going through the various stages of progression of the pandemic. Hence, separate analysis is conducted for the cases when male, female or both are affected, and specific attention is paid to the position of the children.

Our paper contributes to the literature by focusing, in an in-depth analysis, on a limited number of cases to study variation of the behavior of the farm households across the various stages of progression as well as in response to the household role of the member who is going through the stages of the disease. In so doing, it attempts to give an insight into the dynamics of the impact across the stages as well as within stage variations. Moreover, the study attempts to address the issue of possible variation in the households' response strategies depending on the availability of labor markets and limited access to credit markets. It particularly addresses the implications to household labor allocations in the case of HIV/AIDS affected rural households in the Ethiopian context and specifically in the Jimma area where no household level study has so far been carried out. Identifying stage- as well as affected member-specific response strategies is considered an initial step in scaling-up and/or designing

appropriate intervention strategies to improve and sustain the livelihoods of the HIV/AIDS affected households in the setting.

The paper is structured as follows. The next section provides a layout of the approach for data collection and the types of data collected. This is followed by a description of the setting and a detailed description of the cases and analysis of the results. Finally, the last section provides our conclusions.

Method and data

We selected 4 cases of households with an identified HIV/AIDS status for an in-depth analysis of the response behavior to HIV/AIDS at the various stages and with respect to the role of the affected member in the household. The cases were selected based on a strategic sampling technique (Verschuren and Dooreward, 1999).

Selection of research families

Although a random sampling approach might have been preferred for selection, it could not be implemented in this study due to the difficulty of identifying HIV/AIDS affected households in a larger survey. Hence, the strategic sampling helps to avoid potential under-representation through random sampling due to the small sized HIV/AIDS affected sub-population as compared to the total population. The smallness in size is mainly attributed to the lack of testing (either due to lack of information or unwillingness) of the individual farmers, but reluctance to declare the results among those who know their HIV status is also important. The criteria used for selection included: a) being HIV/AIDS positive, b) being a farmer in the research area and c) willingness to participate in the in-depth study. Accordingly, four households were selected for independent in-depth analysis involving HIV/AIDS. These concern

the following households: single male headed (case 1), single female headed (case 2), single absentee male headed (case 3) and both parent deceased (case 4). Two of the families were selected when they came to Agaro town health center to collect their monthly support from an NGO called FIDA through the collaboration of the Gomma zone HIV/AIDS secretariat. The other one was also identified through the collaboration of the Kersa woreda HIV/AIDS secretariat office and his subsequent contacts were facilitated through an NGO called OSSA which is based in Jimma. One of the currently no parent households was identified through the research assistants during the period of collecting the survey data. The terms household and family are used interchangeably throughout the paper.

Strategies for data generation

Frequency of contacts

The study is conducted in three phases representing three important seasons of the year; namely, (i) harvesting and marketing season, (ii) land preparation and sowing season, and (iii) weeding and protection season. This gives a fuller picture of how the families behave during a particular year thereby avoiding a potential bias that may arise from generating data through a single shot approach. Each family was contacted for 5 consecutive days during the first phase and for 3 days each during the second and third phases.

Specific activities during the visits

Observing current daily activities: involves following the day to day activities of the participants that helped to identify the activities and domains of men and women and the allocation of time to the different activities. This includes all on-farm, community,

off-farm as well as inter-and intra-household relations and their terms of arrangements. Such observation assisted in identifying which crops are used for own consumption and how they are processed as well as the daily purchasing and selling activities including who does it and where.

a. Interviewing and participatory analysis on the current activities and historical recollections: by conducting interviews which are also partly based on observation, the farmer is involved in providing data about current activities in comparison with the past. The interview on the current situation involves explaining the household demographic and endowment profile and why they do what they are doing. Data about the past includes how the farming systems and activities evolved over the years of different parenthood status (two-parent, single male parent, single female parent, and no parent) in terms of the relevant variables and why. Specifically, how the different types of household labor (male, female, and child) are allocated among the various farming, off-farm, and other activities and how the household interacts with the labor market. It also includes how the land was used for various activities in the past and how it evolved through the various stages up to the current. That is, identifying crops which increased in importance versus those which decreased in importance in terms of land and labor allocations, the newly introduced and abandoned crops.

b. Farm visits and measurements: this gives quantitative information on the participants' resource endowments and how they allocate them. Under this activity, counting and listing crop species grown in each plot, the number of plots (home gardens and fields), and area of plot allocated by crop took place. It was possible to see which crops are intercropped and to what extent. This is complemented by the on spot inspection of plots during the various operations on the plots.

Data is collected on household composition, assets/endowments, property rights and domains, crop cycle and cropping patterns, labor and non-labor input data, production and consumption data, off-farm participation, other sources of cash and income, and markets and marketing. It also includes data on HIV/AIDS and related illnesses, medical expenditure patterns, changes in cropping and farming practices in the past few years, and access to services.

The setting

The study is conducted in Jimma zone of the SW part of Ethiopia and is located at about 340 kms SW of Addis. Jimma zone constitutes one of the 13 zones of the Oromia Regional state. The research sites are located in two woredas, namely, Gomma and Kersa and households are selected from 3 Peasant Associations (PA) in each site. Gomma woreda is predominantly a coffee growing area while Kersa woreda is primarily known for its cereal growing. A map of the study area and a sketch of the specific locations of the cases which participated in the in-depth study are given in figures 1 and 2 respectively.

HIV/AIDS prevalence

The Oromia Regional State is the largest of the 8 major Regional States of Ethiopia. The Jimma zone ranks second in HIV/AIDS prevalence rate after Adama, among the zones of the Oromia Regional State and Gomma woreda is characterized by high HIV/AIDS prevalence rate among the 13 woredas of the Jimma zone. Hence, 3 of the 4 cases who participated in the in-depth study were obtained from this site whereas the remaining case (case 3) was obtained from Kersa woreda.

Socio-economic characteristics

Farm organization

An average farm is divided into three broad categories, namely, garden, field, and coffee plots in the order of increasing distance from home. The range of main crops grown in the garden include perennials such as enset, coffee, fruit trees (orange, mango, papaya, banana, avocado, guava, and pineapple), qat, sugarcane, seasonal cereals such as maize and haricot beans and roots and vegetables such as taro, yam, kale, pepper, and cabbage. The household may have several field plots which are mainly cultivated for cereal growing the major cereal crops being maize and sorghum followed by beans and teff. The coffee plots are the farthest from home and are mainly planted between forests or shade trees.

Domains in labor allocation

Fields are mainly operated by men and gardens by women. When gardens are predominated by qat and sugarcane, however, male labor becomes important for operating the garden. But this does not mean that the division is strict for all operations. For example, given the current ploughing technique used by the farmers in many parts of the country, women are not supposed to plough the fields or do any activity involving the use of oxen but can participate or replace men for the rest of the farming operations. This situation requires single female headed households to hire-out their fields for sharecropping contract or hire casual labor for the ploughing operation regardless of their physical fitness. Otherwise, both male and female can work in the gardens, fields, and coffee plots with an increasing proportion of male labor time spent on gardens with qat and/or sugarcane. Even in the absence of qat and sugarcane, men are involved in digging, and transplanting enset and other seedlings in

the garden. With regard to marketing, women are entitled to market most of the garden produce and small quantity sales of the field and coffee produce in the case of male headed households.

Markets and services

Land Markets. The setting is such that land is owned and distributed by the state and farmers are not allowed to trade land. Informal land transaction such as through long term contractual arrangements between the farmers does, however, exist. The average land size per household in the area is <1.5 ha and the average family size is 5 persons. The area can be said to be characterized by land shortage as in most rural areas in Ethiopia. As a way of accessing land among the highly land constrained households, there is a sharecropping arrangement which means that the land constrained (and hence labor surplus) household works for the land abundant (and hence labor constrained) household for crop share.

Labor markets. The households in the area can access labor from the labor market through hiring casual labor or entering into a sharecropping contract as the latter is also a way of accessing labor among the labor shortage households or among those with lower labor-land ratio. The role of a given household in sharecropping can be mainly as labor contributor which is labeled as sharecropping laborer (hire-in land) or as mainly land contributor which is labeled as sharecropping land owner (hire-out land). Whereas this implies that a given household must have either of these two inputs to qualify for a sharecropping contract, it does not mean that there is no exchange of other inputs such as seeds between the parties involved. The product share of the land owner in a specific sharecropping arrangement ranges between 33%-66% depending on the input share (mainly labor) of the land owner. The amount of

labor that can be hired for coffee and garden plots in the case of households that need to hire in labor depends on the supply of cash. When it comes to off-farm labor markets, they can be divided into farm off-farm (which involves working on others' farms), self-employed off-farm, and institutionalized off-farm activities. The self-employed off-farm activities include petty trading, firewood and charcoal selling, brewing, running tea/coffee houses, housing construction, carpentry, and cattle trading among others. The employed off-farm activities include working as a daily laborer at the local coffee pulper, commission based coffee collecting from farmers for the pulper, working for the local Peasant Association, and working for a governmental local coffee project.

Credit markets. The only formal source of credit available to the farmers is the farm input credit provided by the local Rural Development Office which is a tied credit package containing improved maize seed varieties and fertilizer. It is non-flexible in terms of responsiveness to the farmer's needs and an all-or-nothing kind of credit which involves down payment. Other than this, the farmers have informal moneylenders (mainly local merchants) for a substantial amount of lending that charge more than 150% interest and in some cases at more than 200% rates. In this sense, the credit market can be highly constraining to the households particularly during the production seasons in the context of HIV/AIDS induced increased household health related expenditures and potential need for hiring labor. We consider the credit markets as missing in the area because of inaccessibility arising from the high costs involved and the rationing of the more favorable intra-household credit over quantity and time.

Product markets. There are two types of market outlets for farm produce, namely the local market and the major/town market. The local market is located nearby the

farmers' areas and is normally active on specific dates (2-3 days/week) and hours. Products sold in the local markets generally fetch lower prices than those sold in the major markets and these markets are normally in surplus particularly during the harvest season in which case products can fetch lower prices than in other seasons. The town market, which is situated at about 5-14 kms from the case farmers' areas, constitutes the major market for the farm produce as well as purchase of manufactured goods. The major market fetches relatively better prices for the farm produce than the local markets which continue to attract merchants reaping the benefits of price differentials. Local market selling as well as immediate harvest selling of farm produce are strategies followed by the households to meet immediate cash needs. The proportion of the produce sold immediately after harvest versus the amount sold after storage, for example red coffee cherry sales versus dry coffee sales, and the proportion of produce sold in the local market (of the total sales) gives an indication of the liquidity constraint or the financial positions of a given household.

Transportation. The households included in the in-depth study in Gomma are located at a maximum distance of 14 kms from the woreda town. There is a transportation facility to the woreda town although it charges about double the normal rate for the distance due to the poor road infrastructure. During the rainy season, even the poor service may not be available as the condition of the road deteriorates. When it comes to the case of Kersa woreda, the road is even worse than Gomma and no public transport is available that connects the village of the case study with the woreda town. Thus, it is common for the household to use mules and donkeys for transportation to the town.

Health services. Each of the sites has one health centre in their respective woreda town. In Gomma woreda, the case households are located 5-14 kms away (2 of them

are 13 and 14 kms and one is 5 kms away) whereas the case household in Kersa woreda is located about 18 kms away from the town health centre. Depending on the availability of a room, the public health centers and the hospital provide a free service for households who can prove they are unable to afford medical expenses from the local PA. Moreover TB treatments are currently provided free of charge.

Schools. In both sites there are primary schools which are located in the villages. The problem, however, arises when it becomes necessary to access high school. Like the health centers, the nearest high school is located in the town, which may be as far as 14 kms away from the village for the households included in the in-depth study in Gomma. Hence, when a child reaches high school level it is common for the households located within the indicated radius to rent a house for the child (usually in groups) in the town so that he/she can only come back to the village during weekends. Hence, there are extra costs incurred in sending children to high school.

NGO support. There are some NGO's based in Jimma town that provide care and support for People Living with HIV/AIDS (PLWHA). In order to benefit from their service, the individual has to present a certificate confirming that they are HIV positive. Their services include education, counseling, home based care under critical situations and monthly financial support in the range of 100-150 Br/month (1USD=Br8.6 based on current rate). One such NGO's is OSSA and farmers getting financial support need to travel to Jimma town every month. On the other hand the NGO called FIDA travels to Gomma woreda town once a month to deliver the financial support rather than the farmers traveling to Jimma. In this case, the farmers getting the support need to travel not more than 14 kms to get their monthly support. Three of the four case households get support from the NGO's. One receives support from OSSA and the other two from FIDA.

Results of the case studies

The section presents a detailed description and analysis of the main intra-household characteristics as well as resource availability and allocation patterns. The analysis focuses on the main questions of the study regarding the dynamics in labor allocation and crop choice and diversity patterns. To this end, the inter-stage and intra-stage dynamics based on the implications of the household role of the affected member are considered in the description and analysis of results.

Description of characteristics

In this section, we describe household composition, socio-economic characteristics (labor allocation, assets and income dynamics) and crop choice and diversity patterns which enable identification of the likely scenarios and define the setting.

Case 1: Meng

Household composition and health status

A description of the household composition of the cases is presented in Table 1.

Meng's family is located in Gomma woreda under the Bulbulo Peasant Association which is 5 kms away from Agaro town. Meng's family moved out of Agaro town to its current residence following the severe illness of his late wife in 2004. Meng used to work for the military (during the period 1988-1990) of the previous regime before he got married to his late wife in 1994. The husband and wife completed 8th and 4th grade respectively before marriage.

In December 2004, the family had 5 members, including the bed-ridden wife, a brother-in-law who came to visit from their home town and their two children. It was composed of a 29 year old male head, a 27 year old wife, an 18 year old brother-in-

law, a 6 year old girl, and 10 month old boy. In January 2005, the size of the household was reduced to 3 following the death of the female spouse and the departure of the brother-in-law. In April 2005, the family size was reduced to 1 (i.e., consisting of only the male head) due to the departure of the two children to an NGO orphanage in Addis. In December 2005, the family size increased to 2 through common law partnership which he was not willing to officially declare until Jan 2006. Meng's wife had her first TB illness in 1995 and was treated 5 times for TB after that. Her last TB illness got worse and she had to be admitted to a Catholic Missionary health centre in Jimma town (40 kms away from their home). When her health status failed to improve after 6 months of hospitalization and treatment for TB, the physician suspected a different cause of her illness and recommended that she be tested for HIV which was how she came to know her HIV status in July 2004. Meng also suspected his status due to his loss of weight and strength and the death of their 10 month old baby in 2002. The baby has also been treated for TB before he died. Meng then got tested for HIV in August 2004 and knew his positive status. The spouses did not declare their HIV status to each other until September 2004.

Meng's wife was discharged from the charity health center in October 2004 and stayed in bed at home until she passed away in Jan 2005 at the age of 27. The total duration since her first illness was 10 years, for one year of which she was bed-ridden. The same year that Meng knew his HIV status, he got his two children tested and the results turned out to be positive for both. Meng decided to hand over the children to a Catholic charity in Addis in April 2005 for which he traveled with them. A description of the health and HIV/AIDS status of the household members is given in Table 2.

Socio-economic characteristics

a. Labor allocation patterns

On-farm labor. As can be seen from Table 3, Meng's farm labor supply decreased during his late wife's severe illness period which continued up to the first phase of the in-depth study. In the second phase of the in-depth study, i.e., the period of land preparation and planting, Meng reported to have reduced participation in sharecropping for the season because he was not in a position to handle the crop protection aspect which is highly labor intensive. This may, however, be partly due to giving up his children to a charity organization and the monthly financial assistance he got from an NGO since Sept 2004.

Off-farm participation. As the size of land owned by Meng's household is small, there used to be a substantial income generated from farm related or other off-farm activities. The amount of off-farm participation, however, declined over time as he had to take care of his ill wife and children. He is also engaged in off-farm activities involving construction work, guarding, and partnership cattle trading. In the latter case, Meng takes part as a financial partner of a share cattle trading business, which does not involve his labor investment for the activity.

Sharecropping. The land constrained household of Meng had always accessed land through sharecropping (as a labor supplying partner) mainly for maize production in his locality.

Casual labor hiring: Meng's late wife used to work as a casual laborer for a coffee pulper during her pre-illness period which was interrupted at the onset of illness. Meng currently works as a daily laborer on activities such as clearing and slashing of coffee plots depending on the state of his health.

b. Household assets/ endowments

Land. The family has only a small garden, which contains a few enset plants, yam, and an adjacent share owned papaya plot. In addition, the family has 0.25ha plot of sharecropped field and another 0.25ha plot of sharecropped coffee. The arrangement in the latter is such that Meng plants the coffee, provides all the necessary labor for weeding and harvesting, and gets 50% share of the produce. He, does not, however, own any part of the coffee land.

Livestock. The trend of change in livestock size does not seem to be uniform for the various types of livestock. The family used to have some sheep during the pre-illness period. They sold 3 cattle and 5 sheep during the period of illness. Currently, Meng's household owns 4 hens two of which are laying eggs and no cattle.

Other assets. Meng's household reduced the value of the house by selling a bigger place in town and buying a smaller one out of town. Moreover, they sold a watch during the late wife's illness period.

c. Income and consumption smoothing

Farm, off-farm and other income. Meng's family currently generates an average annual income of 1200 and 2500/year from farm and off-farm sources respectively. Currently, his family obtains additional income in the form of assistance from an NGO for HIV/IDS affected households which amounts to Br 100/month.

Health expenditure. On average Meng's family health expenditure used to be in the range of 400 and 600 Br/yr during his late wife's illness period whereas his current health expenditure is estimated at an average of Br 50-100/yr. The NGO which fully covered the costs of hospitalizing his late wife was not willing to declare the medical costs for religious reasons. Hence, an attempt was made to estimate the cost based on government rates at Br1200 for the whole period of 10 months of hospitalization.

Access to credit and consumption smoothing. Meng remembers lending money to others on an average year. Currently, his family overcomes food shortage seasons through storing some maize, a service provided by the millhouse, and income generated from involvement in different off-farm activities. Handing over the children to a charity organization may also be considered as a consumption smoothing strategy. Meng borrowed Br 890 for medical purposes during his late wife's illness period at an annual interest rate of 150%. Currently, Meng's family saves 100Br/yr on average which is somehow similar to the pre-illness period. During the illness period the family borrowed to meet food and medical expenses at an annual interest rate of 150%.

Crop choice and diversity.

Meng's home garden consists of 9 enset plants mainly for home consumption, 10 share owned papaya plants, orange, mango, guava, pineapple, and banana. Seasonal crops in the home garden include maize, some pepper, taro, and yam. The family cultivates local maize on the 0.25ha sharecropped land. Recently, Meng has planted some improved variety of coffee in the share owned coffee plot.

Case 2: Kalbi

Household composition and health status

As can be seen from Table 1, Kalbi's family is located in Gomma woreda under Gabene Abo Peasant Association about 13 kms away from Agaro town. Kalbi was born in 1974 to a rural family in the same area she currently lives in. She got married to her first husband in 1992 and was joined by a daughter from his previous marriage. They are both Muslim with the Oromo Ethnic origin, which constitutes the majority

of the population in the area. Kalbi's husband completed grade 8 and used to work for the military in the previous regime before he married Kalbi, his second wife after the death of his first one.

Kalbi attended adult education about 15 years ago and completed 2nd grade. Kalbi's husband died in 1999 and she got married to her second husband in 2002. Her second husband died after 2 years during which she bore him a girl child. Kalbi's step-daughter left her in 2003 because of the pressure from the in-laws and other relatives who hoped to benefit from the claim of her property. In 2004, Kalbi was joined by her 3rd husband who left her after a few months due to a bad rumor about the cause of death of her two late husbands.

Currently, Kalbi has a family of 3 composed of the 32 year old widow head and two boys of age 12 and 7. Her first born child attends school at second grade level after losing one year for dropout. The second one, who has joined school recently, is in the first grade. Kalbi mentioned that she is not willing to send her children to an orphanage and prefers to get financial assistance to cover school and related expenses for the children.

Kalbi knew her positive HIV status in 2004. Kalbi's first late husband used to have the reputation of a hard working farmer until his serious illness started in 1995. At that time she was also healthy and used to work hard on the farm and at home. With the increase in the severity of his illness, his work effort started to decline as he was frequently forced to stay in bed or around the house. As can be seen from Table 2, he was ill for a total of about 5 years of which he spent the last three months in bed until he passed away in September 2000. Kalbi started to suspect the cause of death of her first husband after the death of the second one in 2004 which was followed by the death of her child. She then recalled what her first late husband told her about being

asked by the physician if he had a family and children in his last days in the health center. However, he did not give her any further information about his HIV status.

Since the death of Kalbi's two husbands and a child, there has been a lot of suspicion among the villagers about the causes of death. Kalbi was encouraged to get tested for HIV by a person working for an NGO Voluntary Counseling and Testing (VCT) service in the area and various other people in the area. She subsequently got tested and knew her positive HIV status in September 2004 and even declared her status to the public. Kalbi still does not feel comfortable with the idea of getting her children tested for HIV because she is not ready to face the reality in case either or both of them prove to be positive.

Socio-economic characteristics

a. Labor allocation

On-farm labor. Kalbi's on-farm labor participation fluctuates depending on her health status particularly during the peak labor seasons. On average, her farm labor contribution can be said to have declined currently as opposed to both the pre-illness period and her earlier days of single parenthood. Her current average on-farm labor participation amounts to 50days/year.

Off-farm labor. Kalbi's first late husband was involved in off-farm activities such as sawmill and carpentry in addition to cultivating the family farm. The wooden furniture that he made for the house is an indicator of his skills. At that time Kalbi was also very healthy and worked hard on the farm. Her husband's effort started to decline as he was forced to frequently stay in bed or around the house due to the severity of his illness. As can be seen in Table 3, male off-farm participation during the pre-illness stage is estimated at about 110 days/year. Kalbi's second husband was

also a fulltime off-farm worker in the field of construction and at that time Kalbi also used to work about 60-90 days/yr off-farm. This is because she was strong at that time and did not want to quarrel with her husband over not providing enough cash for household expenses from his fulltime off-farm income. In the past two years, however, she has started to feel weak and frequently fall ill and hence substantially decreased her off-farm participation.

Sharecropping. Kalbi's field plot (0.2ha) has been operated by the sharecropper over the last 7 years since the death of her first husband. Sharecrop cultivation continued during her period of re-marriage as her second husband was a fulltime off-farm worker. Her share of the produce was, however, reduced to 33% from 50% during the period when her farm labor contribution for weeding and crop protection was reduced with the recurring illnesses and inability to pay for 50% of the seed.

Kalbi did not want to operate the coffee farm under sharecropping because she did not want to take the risk of having the sharecropper raise claim over the land in the long run. Due to the perennial nature of coffee, she fears that the sharecropper may start to claim after planting more coffee which would make life difficult for her children in the future. Kalbi remembers an incident of claim over land after a few years of sharecropping cultivation and planting coffee on the plot by a sharecropping laborer on a single female's coffee plot. This year is an exception in that Kalbi, like other female parent households in the area, is getting assistance from the PA in ploughing and sowing. Due to this opportunity, she decided not to give the field plots except the 'chafe' one to the sharecropper. Rather, she thought that she could manage the weeding and protection along with her children and if necessary by asking for assistance from people in the neighborhood. Kalbi, however, recognized a number of pitfalls of such an arrangement with regard to the implications of the demand for cash.

That is, she lacks cash to pay for the seeds and as a result she had to delay the time of sowing in the 2nd maize/sorghum plot until she can secure some cash from her monthly NGO assistance. In the case of a sharecropping arrangement, she is offered the choice to pay for the seeds from the sale of the produce after harvest. She only managed to complete timely sowing in the maize/sorghum plot adjacent to the home garden as she was able to buy the seeds with the little cash she had at hand.

Casual labor hiring. Kalbi started working as a casual laborer after the death of her 1st husband to fill the food shortage gap in the household, particularly during the dry season. She works on others' farms in the weeding and harvesting of maize and sorghum based on a daily rate and processing maize produce in exchange for some grain. On average, Kalbi currently works 28days/yr as a daily laborer depending on the state of her health during the peak seasons. In addition to such hiring-out labor, she hires-in labor on a daily basis depending on the availability of cash when she is unable to work on the coffee plot. On average, Kalbi hired-in 5days of labor/year during her pre-illness period and currently 7days/yr compared to none during her husband's pre-illness and illness periods.

b. Household assets/endowments

Land. Kalbi used to have a total area of about 0.7ha during her two parent status. After the death of her first husband, her stepdaughter claimed over the land when she moved out to her uncle's last year. The daughter succeeded in taking 0.08ha of land to leave Kalbi and her kids with the remaining 0.6ha of land. The total land is divided between 0.13ha garden, 0.2ha maize and sorghum, and 0.28ha coffee. Of the two plots of sorghum and maize, one of them is located adjacent to the home garden and the other one is located at about three minutes walking distance from home. In

addition, there is one maize plot (which is situated in the wetland and is naturally irrigated for production during the dry season between Dec-May) and coffee plot located at a distance of about 10 minutes walk from home. There is also a small coffee plot located at a distance of about 30 minutes walk from home.

Livestock. Kalbi has one heifer and a goat which are both share-owned with other individuals that bought the animals (financial partners) since 2 years and 4 months respectively. As a labor supplying partner of the share cattle owning arrangement, Kalbi provides the shelter and herding, which is mainly done by her children. The arrangement is such that the off-spring and milk (in the case of the cow) are 50% share owned by both partners. Kalbi also has another goat that she bought for Br 35 after someone gave her a gift of Br 20 in Feb 2005. Kalbi belongs to a group cattle herding scheme whereby each member household is responsible for herding for about 8 hours every 17 days for which her children assume responsibility. The goats are kept entirely by the children mainly around the garden. During the second phase of the in-depth study, Kalbi's only hen which she bought with the goat had bred 6 chicks after locally incubating its own 7 eggs and in the third phase of the in-depth interview only two chicks survived a wild animal attack.

c. Income and consumption smoothing

Farm, off-farm and other income. On the average Kalbi currently earns an average income of Br1400/year from farming and Br 200/year from casual labor (off-farm participation). Currently, the only source of income she has other than these is the assistance provided by an NGO for HIV/AIDS affected households which amounts to Br100/month.

Health expenditure. Kalbi's current health expenditure on the average ranges between Br100-150/yr. It includes the expenditure for getting treatment in Agaro health centre and unauthorized local health assistants as necessary and buying self prescribed medicines at the local kiosks.

Access to credit and consumption smoothing. Kalbi currently borrows, on average Br 300/yr mainly for consumption purposes at an annual interest rate of 200%. Kalbi gets credit from local merchants during shortage seasons (Feb-May) in the household for repayment in cash or kind (dry coffee cherries) as she chooses. Selling a part of the flowering coffee stand ('derara') for a season's harvest is also an important activity during periods of food shortage. The other little source of income during the first month of the food shortage season is from collection of dry coffee cherries on the ground for sale. If, however, it is ruined by the rain, it can only be used for home consumption. There was no incident of food shortage in the household in the days of the first husband and they normally had surplus food to give out to others. Currently, Kalbi faces 2-3 months of food shortage per year particularly during the production seasons. The main cause of food shortage at this time is her illness and inability to provide adequate labor for own farm and off-farm activities which leaves her with only 33% share of the product.

Crop choice and diversity

As can be seen from Table 6, Kalbi's home garden is composed of mango orange, coffee, guava, enset, and few other trees which used to be sold for timber before it was prohibited by the government and fencing, all the work of the first husband.

Seasonal crops in the home garden include maize, haricot beans, kale, pepper, yam, and some tomato. In addition to this, the garden used to have sugarcane, papaya, and

more enset during the days of her first husband. The field plots are allocated to maize and sorghum. Moreover, every year the maize and sorghum rotate on each of the field plots except on the 'chafe' plot (wetland), where only maize is grown every year. The plot adjacent to the chafe maize and another plot located at a distance of 30 minutes walk constitute the coffee plots. Kalbi recently replaced the improved maize variety by a local variety. This is because of the unfavorable terms of credit linked to the local variety and the greater levels of fertilizer that are required for the same land every year which have led to a considerable number of the villagers stopping using it. Kalbi indicated that one of the orange trees and 50% of the coffee plants in the farthest plots were planted just a few months before the death of the first husband.

Case 3: Oli

Household composition and health status

Oli's family is located in Kersa woreda which is 18 kms away from Serbo town. Oli was born in 1977 to a farming family in the same area in which he lives now. He dropped out of school before completing 9th grade in order to get married and was not able to resume afterwards. He got married to his first wife in 1996 that he divorced in 2000. In 2001 he was remarried to his second wife who passed away in 2004. Oli has a 6 year old boy from his late wife. Their demographic characteristics are summarized in Table 1.

It has been 4 years since Oli migrated to Serbo town where he currently works. He settled in town after he got a fulltime job as a school guard with the assistance of the HIV/AIDS secretariat in the area. Since then, Oli's parents, including his sister who used to be located not so far from his village, moved to his village house to take care of Oli's child and farm in addition to their own. His child has not yet started school

because he is under age for the area. Recently, he has been joined by a new partner in the town where he lives. This family is referred to as an absentee single male parent household throughout the study.

As can be seen from Table 2, Oli's late wife fell ill in 1998 and died of HIV/AIDS in 2003 at the age of 22. Following her illness, Oli got tested because of his suspicion of the symptoms of her illness and knew his positive HIV status in 2002. The same year that he learnt of his HIV status, he decided to migrate to Serbo town in search of a job leaving behind his farm and his 3 year old child with the grand parents. After he knew his HIV status he also got his child tested and proved his negative status. His wife had been seriously ill for 3 years of which the last year was spent mostly in bed before she passed away.

It has been 4 years since Oli started falling ill and staying in bed for 3-4 days/month on average his main illness being recurring sores on his face and around his neck. In December 2005, he started taking Antiretroviral Treatment (ART) which is provided at the Jimma hospital for free after undergoing some tests. For this reason he is required to travel to the hospital at least once a month for a check up with a physician in Jimma town, which is 22 kms away from his home. He had some diarrhea and related illnesses the first 2 months after he started the treatment after which time his health started to improve.

Socio-economic characteristics

a. Labor allocation

On-farm labor. The farm labor supply of Oli and his late wife was 120 and 80 days/year respectively during his late wife's illness period, This continued to decline during the illness period and after. Currently, Oli does not supply labor to farm

activities back home which implies a reduction from a 100% own farm labor supply during the pre-illness period.

Off-farm labor. During the pre-illness stage Oli was involved in off-farm activities involving trading contraband items extending from the capital to his village during the seasons when agricultural work is at relative ease. His current off-farm labor participation has drastically increased as he turned into a fulltime off-farm worker following the severe illness of his late wife.

Sharecropping. Oli's entire farm used to be operated by family labor during the pre-illness stage. Following the severe illness of his late wife and hence migration of Oli, the farm except the 0.13ha garden and 0.13ha coffee plot started to be operated through a sharecropping laborer.

Casual labor hiring. Oli's coffee plot back home is mainly being operated by hired labor which on average amounts to 10days/year from the status of zero labor hiring during the pre-illness period.

b. Household assets and endowments

Land. During the pre-illness stage Oli's family used to have 4.5ha land composed of 0.25ha garden, 4ha field, and 0.25ha coffee plots. The total area of land has not changed since then and no land transactions have been carried out by the family.

Livestock. Oli's family used to have 9 sheep, 5 oxen, 10 cows, and 4 mules during the pre-illness stage. Currently, the family owns only 2 oxen, 3 cows, 2 mules, and 10 poultry after selling the rest of the livestock for reasons of meeting health expenses and uncertainty about the future.

c. Income and consumption smoothing

Farm, off-farm and other income. During the pre-illness period, Oli's family used to earn an average annual income of Br 5100 and 4000/yr from farm and off-farm sources respectively. Currently, the household's earning from farming and off-farm sources is estimated at Br 2500/year and 2700/yr respectively. In addition to the income that Oli earns from his on- and off-farm activities, he receives financial assistance from an NGO amounting to Br150/month.

Health expenditure. The health expenditure of Oli's family is estimated at Br 400/yr and 360Br/yr during the female and male illness periods respectively. Currently, Oli started Anti-retroviral Treatment which is covered by the public service except for his travel and related expenses as he is required to travel to Jimma 2days/month on average. The public medical expenditure is estimated at Br 2200/yr and his travel and related expenditure at Br 1200/yr.

Access to credit and consumption smoothing. Except the credit for improved maize seeds and fertilizer package from government sources, which amounts to Br 890/yr, no credit demand has been reported by Oli's family at any stage. The amount of annual saving of the family is, however, reduced to zero from an average of Br 600/yr during the pre-illness stage. Oli who is now living in town bridges his food shortage gaps by receiving some of the farm produce back home.

Crop choice and diversity

As can be seen from Table 6, Oli's garden is currently composed of enset, coffee, qat, papaya, orange, mango, guava, avocado, banana, and maize. His field plot consists of maize, sorghum, haricot bean which is intercropped with maize, teff which is rotated with sorghum, taro, and some fallow land. Enset and pepper are recent introductions to the garden in place of sugarcane and reduced maize area following Oli's migration.

Moreover, the recent fallowing of 0.38ha land is because the sharecropper is not willing to work unless it is fenced as the land is on the edge and prone to animal attack. When the land was family operated, it used to have a fence which is now destroyed and no one has the incentive to replace it.

Case 4: Sam

Household composition and health status

Sam's family consists of the currently no parent household of the cases which participated. Sam's family is located in Gomma woreda under Gabene Abo Peasant Association at about 14 kms away from Agaro town. The late parents of Sam were joined in marriage in 1987 and had 4 children during their life together. The husband and wife completed grades 9 and 6 respectively both before marriage. It has now been more than 8 years since Sam's mother and father passed away at the age of 33 and 27 respectively. Sam, the oldest of the children in the family was born in 1989 and was only 9 years old when he lost both of his parents. The late wife's mother and brother moved into the family following severe illness of Sam's father and since then they assumed the fostering role as family members. For this reason the grand parents had to leave their own family which is located at about one hour walking distance.

As can be seen in Table 1, Sam's surviving brothers are now 13 and 17 years old while his grand mother and uncle are 45 and 16 years old respectively. Currently, Sam who is 18 is mainly responsible for the main decisions in the household and the role of the extended family members is reduced to a caring one. During the first phase of the in-depth study, there were three school age children in the family including Sam of whom one was high school level and the other two were junior level. This year (Sept 2005), one of the junior level ones had to join high school which is located in

Agaro town. The family was, however, unable to afford to send two children to high school and as a result the elder one had to dropout at grade 9 in order to be able to send the younger one to high school.

Unlike other information, getting specific health information from extended family members concerning people who passed away 9 years ago is very difficult and may not be very precise. However, I put maximum effort into getting the best information I could, including involving some of the neighborhood in the discussions.

Sam's father passed away after about 4 years of illness, the last 6 months of which he mostly spent in bed. During his illness period he got tested and his HIV/AIDS status proved to be positive. Sam's mother died shortly after the death of her husband with only 4 months lag, her total duration of illness being 3 years. The surviving family members have no information as to whether Sam's mother had been tested for HIV except their own suspicion because of the symptoms they observed during her illness and her late husband's known status. Two years ago the 9 year old brother of Sam died of AIDS after 3 years of total illness period. As can be seen from Table 2, both Sam's late parents as well as his late brother were diagnosed and treated for TB during their respective illness period.

Socio-economic characteristics

a. Labor allocation

On-farm labor. Although farming has always been the major source of income for Sam's family, his late parents had little labor contribution to farming. Their limited labor contribution is used to be manifested during the seasons of weeding and harvesting. The same trend continued after they both passed away leaving their farm and little children under extended family guardianship. Recently, child labor

contribution to farming has been increasing as the children invested some labor mainly in the coffee plot which had been almost unproductive for lack of labor until recently. This has been practiced as part time farming with schooling. With the current school dropout of one child, the farm labor contribution is expected to increase soon. On average, the current number of child labor days on the farm ranges between 40-60/year.

Off-farm labor. Sam's late parents had always been fulltime off-farm workers until the onset of illness. His late father used to work as a secretary of the local PA and run his own seasonal coffee trading business. His late mother was involved in self-employed business of local brewing and food selling in the house. Both off-farm activities died following the severe illness of the parents and no one among the remaining family members has ever been involved in off-farm activities since.

Sharecropping. The entire 0.81ha field plot of Sam's family has been cultivated through sharecropping even during the pre-illness period. Although the family members complain about productivity decline since the decease of parents, the field plot has continued to be cultivated through a sharecropping arrangement. Recently, Sam's family decided to cultivate the part of the garden under qat through a sharecropping arrangement in addition to the field plots.

Casual labor hiring. Hiring-in casual labor has been normal practice in Sam's family even during the period before the decease of parents. The family is used to hire-in casual farm labor to clear and slash the coffee plot and some of the garden qat. Labor hiring is also practiced currently for the coffee plots although with a reduced amount due to cash constraint.

b. Household assets and endowments

Land. Sam's family used to own 1.875ha of land during the two parent status of the household. The land size decreased to 1.688 due to the claim by the local PA after the death of both parents. The total area is divided into four plots consisting of the garden, two field plots and a coffee plot. The family sold 0.125ha of land about two years ago in order to cover the medical expenses of the late child.

Livestock. The livestock holding of Sam's family during the two parent stage was composed of 3 oxen, 14 cows and 7-10 poultry. Currently, the family owns only one ox after selling the rest to cover health related expenses for the late child and for consumption purposes. The family has to pair-up oxen with the neighborhood during the ploughing period.

c. Income and consumption smoothing

Farm, off-farm and other income. Sam's family used to earn an average income of Br 7000 and 6000/yr from on-and off-farm sources respectively during the pre-illness period. Even during the period of illness, it is the off-farm income which showed a substantial reduction. Currently, farming is the only source of income for the family which generates an average income of Br 3500/year.

Health expenditure. The health expenditure of Sam's late parents was fully covered by the family and it is estimated at about Br4000. The parents drained their savings during their illness and non-working period and left an empty account for the surviving family members. Recently, health expenditure during the illness period of the late child was estimated at Br1200/yr. As the family is assumed to be relatively well-off, which was only the case during the two parent stage of the household, none of the ill members has ever had access to free medication. Currently, Sam's family

has not reported any serious illness or related expenses among the remaining family members.

Access to credit and consumption smoothing. The current average borrowing by Sam's family amounts to Br 200/yr. Like the rest of the people in the area, Sam's family gets credit from local traders for more than 200% annual interest rate. In addition to this, the reciprocation of assistance with the grand parent family in the form of grain and other food items is important in bridging consumption shortages.

Crop choice and diversity

Sam's garden is currently composed of enset, coffee, qat, papaya, orange, mango, guava, avocado, pineapple, and maize. Sam's 1.688ha field is currently used for growing two varieties of maize, namely, local and improved (BH660). During the two parent stage of the household, the entire maize cultivated was improved variety.

Analysis and Interpretation of results

In this section, we look into the analysis of the changes in the status as well as the response strategies at the various stages of HIV/AIDS progression in light of how the households allocate their resources across activities. The resource allocation patterns in terms of changes in the various types of farm and off-farm labor allocation patterns and crop choice and diversity patterns are analyzed in Tables 7 and 8 and discussed. In the analysis of the changes in each table, pre-illness period is taken as a base period (and thus assigned a 0 value for the specific variable under study) from which changes in the rest of the columns are derived.

Case 1: Meng

Meng's household can be described as a 31 year old single male headed household who has recently handed over his two children to an NGO orphanage. Within a year's time Meng's household demonstrated a shift from the stage of two parent household to a single male parent household, followed by single male headed household and then to one of a couple with no child through re-marriage/ common-law partnership. As a land scarce household, the family accesses 0.25ha field (maize plot) and 0.25ha coffee plot through sharecropping arrangements. The household is highly dependent on off-farm activities both during the pre-illness period and current. Meng's household exhibited asset depletion through livestock sales, some land exchange, and selling a watch. The number of cattle and sheep declined during the stage of illness of the late wife as the household was forced to sell them in order to meet increased cash demand. The change in household farm and off-farm income parallels the degree of change in farm and off-farm labor supply by the household members such that total income decrease was observed during the period of illness as compared to the pre-illness stage. Looking at the inter-stage differentials, however, the recent trend is getting better for Meng as the previously care giving time and cash cost (both for the late wife and for the children currently living at the orphanage) is now available for more productive uses. In effect, this household can be said to be better-off now than the illness period.

Labor allocations

The changes in the allocation of the various types of household labor throughout the stages are presented in Table 7. Meng's household exhibited only a slight decrease in on-farm labor allocation during his late wife's illness period, which could be explained by the fact that the household is land scarce. Male farm labor supply has

increased following the death of a female spouse after a long period of severe illness demanding intensive care both for the patient as well as the young children. On the other hand, both female and male casual labor hire-out declined following his late wife's illness with the latter being reduced to zero when the female fell severely ill. There seems, however, to be a potential to increase the level of male casual labor supply following recovery from the impact of her recent death. Meng, who recently turned to a common-law partnership, has continued his involvement in hiring-in land for sharecropping as his land is small compared to his work capability.

Moreover, both female and male off-farm participation declined following female illness. Male off-farm participation decreased during the period of his late wife's severe illness (for about 1 year) as he is responsible for caring for the 2 children (including a 10 month old baby) in addition to taking care of his ill wife. Recently, his off-farm participation has started to increase and given the good health status of Meng, there is a potential for further increase in off-farm participation unless the backward bending leisure-labor supply trade-off holds due to the effect of the increase in net income. That is, recent NGO support for the households who declared their status and handing over both his children to an NGO orphanage.

A summary of the response of male and female farm and off-farm labor allocation for each of the cases across the stages is given in figures 3 and 4. The stages considered in the graph are the pre-illness, illness, after death, and current which are labeled as stages 1, 2, 3, and 4 respectively in the horizontal axis.

As depicted in Figure 3, male farm labor supply remained the same for Meng's household (case 1) as the household moves from stage 1 to 2 while female farm labor supply declined. Such response is not surprising given the fact that case 1 is land constrained and normally accesses land through sharecropping. Between stages 2 and

3, male farm labor supply remained constant for cases 1 and 4 whereas it has shown a slight increase after stage 4. After stage 2, female farm labor supply remained at zero level.

Figure 4 depicts that male off-farm labor supply declined at the onset of stage 2 for Meng's household whereas it declined as the household moves to stage 3. Between stages 3 and 4, male off-farm labor increased. The degree of female off-farm participation remained at zero level following the onset of stage 2 and after.

Crop choice and diversity

Given that Meng is a land scarce household, no change is expected in terms of the type of crops grown outside the garden. Little change has been observed in the garden except for the planting of some fruit trees during his late wife's illness period. Enset planting increased in Meng's garden on existing spaces only without significantly affecting other garden crops. Since the household faced death very recently, it may be premature to talk about the responses in terms of crop choice following death. The change in crop diversity throughout the stages is summarized for each case in Figure 5. As depicted in Figure 5, the overall farm level number of crop species slightly increased for Meng's family.

As can be seen from Figure 5, the number of crop species has slightly increased for Meng's family as the household moves from stage 1 to 2 and after which it remained the same. On the other hand, the number of field crop species grown did not change across the stages. Hence, the dynamics of the total number of crop species will be the same as that of the dynamics in the number of garden species. As this household accesses field plots through sharecropping, the fact that the same number of crops could be maintained across the stages indicates that farm labor has not changed much.

Case 2: Kalbi

Kalbi's household can be characterized by a 32 year old single female headed household with two under age children who has been remarried 3 times and lost a 2 year old child. The current family income is estimated to be more than 50% lower than the amount during the pre-illness stage due to reduced income, increased health related expenditures, and high cost of borrowing. Income is mainly generated from her sharecropper operated farm, family and some hired labor operated coffee farm, family labor operated garden, and some off-farm farm farming activities. Currently, the family gets some financial support from an NGO for people living with HIV/AIDS.

Kalbi's household exhibited a decrease in land holding by 0.08ha because of claim over land by her step daughter and 100% reduction in the size of cattle through sales to meet some medical and consumption expenditures following the death of the male spouse. She also sold household utensils for the purpose of meeting medical expenses for her late child. Recently, however, the family has started to increase the number of livestock through 50% share cow and goat owning as well as purchase of a goat. The increased number of animals is also the result of change in the expenditure pattern arising from a concerted effort to leave real capital for the children to live on after she passes away.

Labor allocations

Kalbi's family was labor surplus before the shock whereby male labor is hired-out for 50% product sharecropping arrangement during the pre-illness stage. That is, her family used to hire-in land through a sharecropping arrangement during the pre-illness stage in addition to cultivating their own farm. In an attempt to mitigate the problem

of shortage of labor for farming following the illness and death of a male spouse, Kalbi hired out her field plots through a 50% product and input sharecropping arrangement. Male farm labor supply decreased during illness until it was completely withdrawn at death of the male head who was operating the farm. The degree of care demanded during his illness period also implied a decline in the amount of female farm labor supply although she managed to increase it during her early stages of single parenthood as can be seen from Figure 3.

Her sharecropping arrangement is such that the sharecropping laborer provides his labor for the major operations (except that she is required to assist in weeding and harvesting) and half of the seeds. In addition to sharing 50% of the input costs, Kalbi assists in supplying labor for weeding and harvesting on the sharecropped land. Although Kalbi faces labor shortage on the coffee plot, she considers the future risk of losing land for the decision as to whether the coffee plot should be operated through sharecropping, which has implications for the children's future. Due to the associated risk of claim over the coffee land in the long run arising from its perennial nature, Kalbi decided to use hired labor for weeding and slashing of the coffee plot instead of sharecropping cultivation. An adequate amount of labor hiring could not be maintained, however, due to of scarcity of cash.

The advantage of a sharecropping arrangement is that in most cases, the sharecropping laborer buys the farm inputs mainly seeds and Kalbi (the sharecropping land owner) reimburses half of the input cost at harvest. In the event that this is not possible, there is a possibility of getting only 33% of produce if Kalbi opts not to share any inputs. At this stage, however, Kalbi is unable to supply off-farm farm labor to generate income. During her illness period, which is somehow recurring, her labor contribution for weeding and harvesting of the fields was reduced and as a result her

product share reduced to 33%. Increasing levels of child labor involvement have been reported in the activities of weeding and harvesting recently. The children also assist Kalbi in herding livestock, fetching water and firewood, harvesting coffee, picking coffee from the ground ('chirosh' coffee) mainly for home consumption and some sales, and crop protection from domestic and wild animal attack on the maize and sorghum plots near the house. As regards the coffee plots, Kalbi cuts some weeding operations during certain times of her illness period and lacks the necessary cash to hire-in casual labor. Recently, her children have assisted her in harvesting and selling coffee at the local market. On the other hand, the labor requirement of the garden is partly met by herself and sometimes with labor assistance from neighbors.

As can be seen in Figure 4, male off-farm participation started to decline at the onset of illness and Kalbi started off-farm participation (which involves mainly working on others farms on a daily basis) after the spouse deceased. Figure 4 further reveals that there was a slight increase in male off-farm labor supply due to remarriage for sometime after the stage of single parenthood. For Kalbi's family where the gap between male death and female illness is longer, female off-farm participation increased during the period of single female parenthood.

Finally, it is evident that Kalbi's household has transferred from a labor surplus to a labor scarce one as the household becomes increasingly dependent on the market for farm labor throughout the stages of progression of HIV/AIDS. Recently, with the growing of children, some child labor supply is becoming evident mainly for activities such as crop protection, harvesting, and livestock herding.

Crop choice and diversity

Kalbi abandoned sugarcane production in the garden since the death of her husband and replaced it by increasing the area for maize. The improved maize varieties which used to be produced in the fields before her first husband's death are now abandoned and replaced by the local maize varieties. Similarly, enset and papaya declined in importance following male death which is manifested through decreasing the number of plants. As can be seen in Figure 5, the total number of species in Kalbi's garden as well as the overall farm is less now than during the pre-illness stage. Considering Kalbi's as the relatively most labor constrained household of the cases, her response in reducing crop diversity in the garden raises the question that increasing diversity is a labor demanding activity and hence not expected among the labor and cash constrained households like Kalbi.

Case 3: Oli

Oli's household can be characterized by a 30 year old absentee single male parent household who is currently residing in town after migration following the severe illness of his late wife. He left his 5 year old child under the extended family guardianship who moved to Oli's village home to assume responsibility to supervise the sharecropper operated farm of Oli. His family has faced >50% reduction in the size of cattle as well as pack animals following the severe illness and death of his wife.

Oli thinks that his farm productivity is far lower (about 40% lower) now than when his farm was cultivated by family labor. Due to his involvement in permanent off-farm activity in town, however, the proportion of off-farm income as a component of the total income has increased now compared to during the pre-illness stage although the amount of income per unit of off-farm labor is lower. In addition to the health

expenditure covered by the household, Oli has recently been incurring health expenditure for anti-retroviral treatment, which is covered by the governmental public services.

Labor allocations

As can be seen from Figure 3, own farm male labor supply declined in Oli's family due to parental migration. He has given out his land for sharecrop farming regardless of his work capability due to his preference to migrate to the nearby town after knowing his HIV status. Casual labor demand has also increased for Oli's coffee plot since then. Currently, Oli turned into a fulltime off-farm worker from a part-time one during the late wife's pre-illness stage. As a result, his off-farm participation has drastically increased after the stage of illness to the current as depicted in Figure 4.

Crop choice and diversity

Sugarcane disappeared in the currently absentee male headed household of Oli while onset, coffee and fruit tree planting have increased in his garden. Moreover, pepper has been introduced in the field since 3 years. As a result, the garden, field and total number of crop species on Oli's farm has slightly increased now as compared to the pre-illness stage as depicted in Figure 5. Moreover, the same varieties of crops are now being produced on the field. Recently, Oli's 0.375ha plot, on which the family used to cultivate maize during the pre-illness stage, is left fallow. In Oli's household, increasing onset planting is the extended family decision, which is more attributed to labor and cash shortage.

Case 4: Sam

Sam's household can be described as a household size of 5, which is run by fostering grandparents who joined the household since the severe illness of the late parents. The main source of income is generated from the sharecropper operated field plot, hired and family labor operated coffee plot (after a long period of almost abandonment), and garden. Recently, Sam, who is now 17, is taking over a considerable responsibility in household resource allocation decisions whereas the role of the extended family members is diminishing to domestic care giving.

The land size of the family has decreased by a total of 0.3ha of which 0.175ha is due to claim by the local Peasant Association following the death of parents and 0.125ha is due to selling land in an effort to ease the prevailing financial constraints. Cattle size is >90% less now than during the two parent stage of the household through a gradual decline following the illness and death of parents. Currently, the household owns only one ox which they pair-up with the neighborhood for mutual benefit during ploughing. Sam's household also exhibited selling of watches and gold jewels worth about Br 2000, which they inherited from their late parents, in order to meet some medical expenses for the late child and consumption needs during periods of food scarcity. Moreover, off-farm income of the household is reduced by 100% following the decease of both parents. Total household income is about 70% lower now than during the 2 parent stage of the household. Sam's family health expenditure during parental illness period is roughly estimated at about Br 4000/yr and recently, the health expenditure for the late brother of Sam is estimated at Br 1000/yr. No current medical expenses have been reported by the household. There is a potential for more child involvement in generating farm and off-farm income as the children grow up.

Labor allocations

For Sam's family, farm labor supply did not change much following parental illness as they were both involved in fulltime off-farm activities although the main source of income is farming operated through sharecropping. As depicted in Figure 3, the amount of male and female farm labor supply was small during the pre-illness period as well which is reduced to zero after the onset of illness. Child farm labor supply increased recently with the increase in the age of the children and increase in work capacity to run their household farm.

The level of casual labor demand for operating the garden and coffee plots has declined due to shortage of cash and as a result the coffee plot has almost been unproductive until recently. Shortage of cash also caused the household to give out the garden qat for sharecropping cultivation recently. Moreover, as the gap between the male death and female serious illness is short, female off-farm labor participation declined following male illness. As can be seen from Figure 4, the level of male and female off-farm labor supply decreased drastically following the onset of illness of parents.

Crop choice and diversity

For Sam's family, the change in crop choice takes the form of introducing enset and increased fruit tree planting in the garden recently. As can be seen from Figure 5, the total number of crop species grown is lower now than the pre-illness stage although it has shown a slight increase recently as compared to stages 2 and 3. The decline is mainly attributed to the loss of a part of the field through land confiscation. The recent tendency to increase the total number of species is attributed to the introduction of enset in the garden. Moreover, the improved maize variety in the fields has been partly replaced by a local one.

Conclusions

We are aware of the difficulty of making generalizations based on the four cases involved in the in-depth analysis. We are, however, convinced that our results give insight relevant for intervention strategies. The conclusions that are drawn regarding the importance of the stages of HIV/AIDS manifestations and the household role of the affected member to the labor allocation and crop choice behavior of the households are presented.

Responses with respect to the stages

Labor allocations

A household's labor allocation (which involves simultaneous decisions on the degree of involvement in farm, off-farm, hiring casual labor, and sharecropping) is influenced by the stage of HIV/AIDS. This is because the stage of HIV/AIDS manifestation affects the demand for replacement labor given the specific household and market characteristics. In the short run, given availability of labor markets and constrained access to credit, the labor allocation response to HIV/AIDS appears to be driven by the implication of the stages both for the availability of labor and for the cash constraints. This is manifested by the fact that all the households, except the land constrained one, are involved in sharecropping for operating the field plots. The possibility of engagement in sharecropping implies that the impact of labor shortage is more likely to be reflected on the plots which cannot be operated through sharecropping particularly for highly cash constrained stages. This is because replacement labor in such plots involves cash outlay, i.e., mainly plots which have perennial orientations. As a result, a substantial reduction in labor intensity is observed both in the coffee and garden plots following severe illness. Availability of

sharecropping options further implies that for households with land titles, a severe impact of loss of farm labor is more reflected through reduction in income than gross production. With lack of land titles and/or increased degree of confiscation following loss of adult(s), however, the impact may go beyond production and income as it endangers the overall survival strategies.

Off-farm participation is observed as an important strategy to ease the cash constraints following adult illness or death. The degree of off-farm involvement depends on the demand for care during the illness stage and whether the remaining spouse is healthy enough to participate in off-farm activities (or at which stage of HIV/AIDS manifestation the remaining spouse is situated). Increased off-farm participation is observed in all the cases following death of a spouse in cases where the time lag between the death of one parent and illness of the second is longer. Such a response is also reflected in the studies of Loevinsohn and Gillespie (2003) where they indicated that HIV/AIDS causes households to reallocate labor towards non-agricultural activities that yield quick returns. Our cases lead to similar conclusions regarding the tendency to favor quick return activities in the context of HIV/AIDS. Apart from being prominent after the stage of death of one parent, the off-farm activities in our case are not entirely non-agricultural as some of the households also hire-out casual labor on other's farms.

Crop choice and diversity

Unlike farm labor allocation patterns, adjustment in land allocation pattern (i.e., crop choice) tends to be gradual. Most of its effects are reflected at later stages of illness and death and they are plot specific. Plots are important for such adjustment as the room for flexibility in terms of household crop choice decision varies across plots due

to the predominant role of customary crop choice decisions in some plots. Customary risk pooling and hence customary crop choice in field plots and availability of replacement labor imply that increased illness and death of adult members among HIV/AIDS affected households does not necessarily translate into change in the types of species grown in the fields. The likely changes on the fields are the variety of crops (as long as the choice on varieties has implications to tightening the cash constraint), the operator of the plot, and the product share (and hence income) of the particular household.

As long as replacement labor can be accessed for the home garden, the change in the number of crop species grown does not appear to be significant although the choice of crops has been altered particularly after death. All the households exhibited change in at least one crop species either through new introduction, partial or complete replacement between crops in home gardens mainly during the stages following severe illness.

The stage sensitive analysis indicates that the extent of change in the response behavior is influenced by the stage of manifestation of the pandemic. More significant changes are likely to be expected during the periods of illnesses and death in the household. The fact that all the cases knew their HIV status only following severe illness or death of one spouse calls for scaling up existing intervention strategies in creating awareness and pursuing households including those with non-ill members to get tested for HIV. Similarly, awareness should be created to get children tested for HIV in HIV/AIDS affected households in order to ensure proper caution afterwards.

As sharecropping is important in easing the labor and cash constraint among the households, during parental illness and death, it may be beneficial to institutionalize it so as to ensure easy access to the needy as well as reduce the associated insecurity.

Moreover, support in the form of financial, medical, and home-based care appear to be more relevant intervention strategies at the stage of illness whereas creating off-farm employment opportunities are more appropriate after death of one of the parents.

Response with respect to the role of the affected member

Labor allocations

The decision regarding labor allocation and involvement in sharecropping differs for single male and female parent households, in various stages of the disease. In the case of the single female parent household, hiring-out annual field plots for sharecropping seems to be inevitable as the household tends to continue to be stationed on the farm. On the other hand, single male parent households could either continue to hire-in land depending on the size of their holding versus their work capability or hire-out land for sharecropping in the event of choosing to migrate. The domestic household role of single female parents implies that they have greater likelihood of failing to satisfy the labor requirements for equal sharecropping and as a result their product share tends to be precarious and below 50%.

The case of no parent households depends on whether fostering parents have adequate labor to run the farms following the decease of both spouses. For labor constrained fostering households, the response regarding involvement in sharecropping is similar to that of the single female parent households. Increased hiring-out casual farm labor (off-farm farming) has been observed in the case of the single female parent household whereas increased participation in other off-farm activities is observed among the single male parent households including fulltime off-farm involving migration.

Crop choice and diversity

The analysis shows that more labor intensive crops such as sugarcane decreased in importance in the case of the single female parent as well as the absentee single male parent household. Moreover, enset production and overall number of crop species decreased in the case of the single female parent household. The rest of the households increased the number of enset planting both during their single male and no parent status. The response in abandoning a labor intensive crop like sugarcane and replacement with food crops has been reflected in the studies of Haddad and Gillespie (2001) and Yamano and Jayne (2002) following loss of adult male. A similar tendency of favoring less labor demanding crops in the fields of single women has been found by Salick (1992) and Song (2003) although their studies are not specific to HIV/AIDS. The fact that some food crops are reduced in importance in our finding suggests that the crop cycle in the context of the change in the decision horizon of the households following the stress as well as access to replacement labor are important in crop choice decisions.

Differences in the household roles of the various members, differential likelihood of staying on the farm after knowing HIV status, and differential claim over land of the surviving members after loss of spouse(s) between male and female affected households influence the adjustment in labor allocation and crop choice. The fact that the household role of the affected member influences the response strategies of the households has implications for scaling-up affected member specific intervention strategies. Firstly, for the case of single female and no parent households, facilitating land titling for the surviving members as well as enhancing enforcement to avoid unfairness in cases of land confiscations are crucial. Secondly, legal enforcement to avoid the insecurity associated with sharecropping of perennial plots (particularly

among single female and no parent households) is relevant. This helps to address the issue of cash constraint for hiring replacement labor and farm input purchases through sharecropping and hence indirectly increasing access to an informal farm input credit source. Moreover, the need to meet domestic household roles among single female parent and fostering parent households implies that their range of available off-farm employment opportunities tend to be limited to off-farm farming and self-employed off-farm activities around the house yard as opposed to their male counterparts. Therefore, another important area of intervention for single female and fostering parent households could be to increase access to local off-farm employment opportunities through providing support to initiate their own off-farm activities. An increased involvement in small animal production activities by the single female parent household also indicates a potential area of intervention on activities that could be run through part time child labor assistance. Increased access to off-farm employment opportunities is also important for single male parent households although more diverse choice for the location and degree of involvement could be considered in this case. Finally, enhancing free mobility of labor helps to benefit from the advantages of sharecropping as well as long term off-farm participation in the context of HIV/AIDS.

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Tables and figures

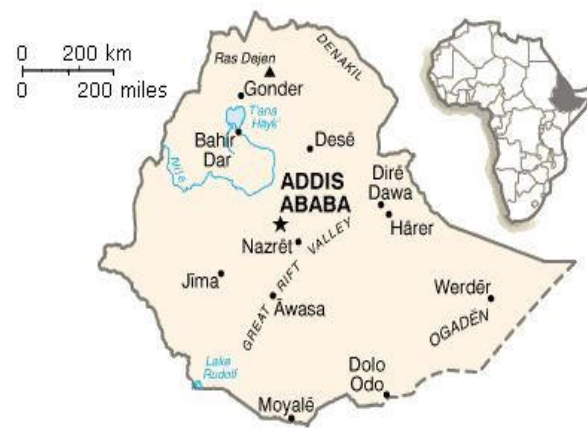


Figure 1. Map of the study area

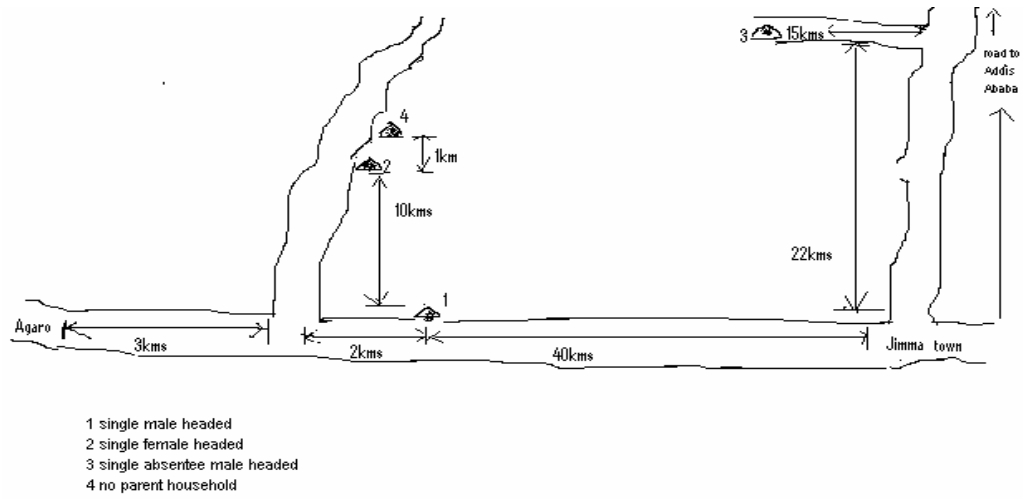


Figure 2. Location sketch of the cases 1-4 in the Jimma region in Ethiopia.

3a.



3b.

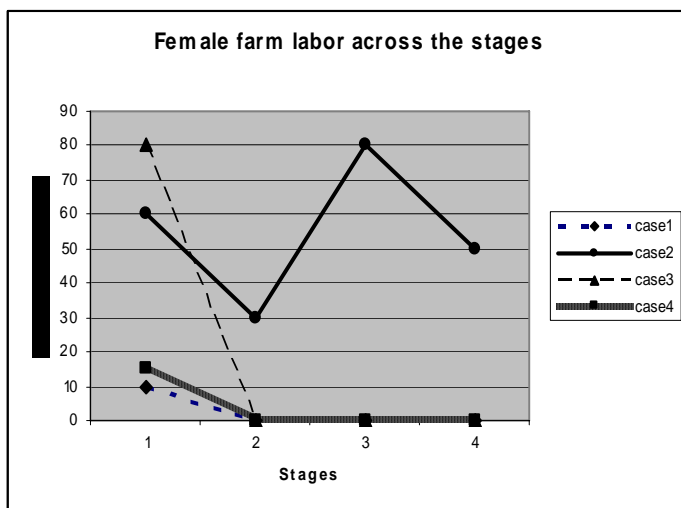
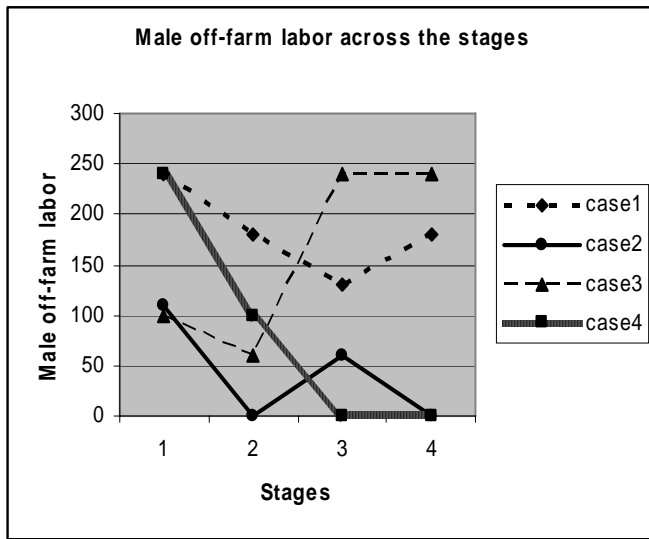


Figure 3. Male and female farm labor allocation across the stages, cases 1-4.

4a.



4b.

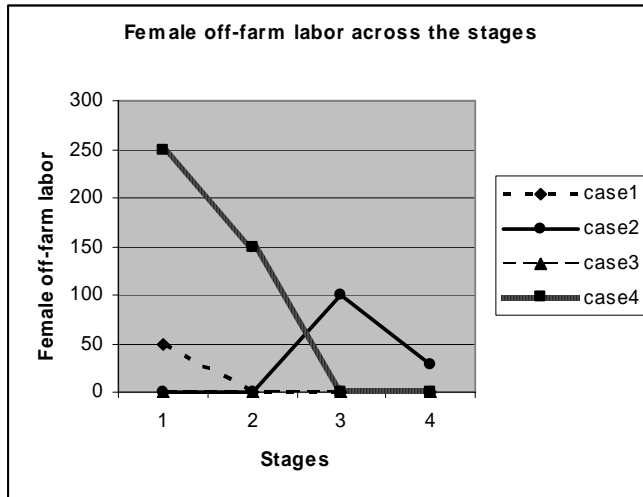
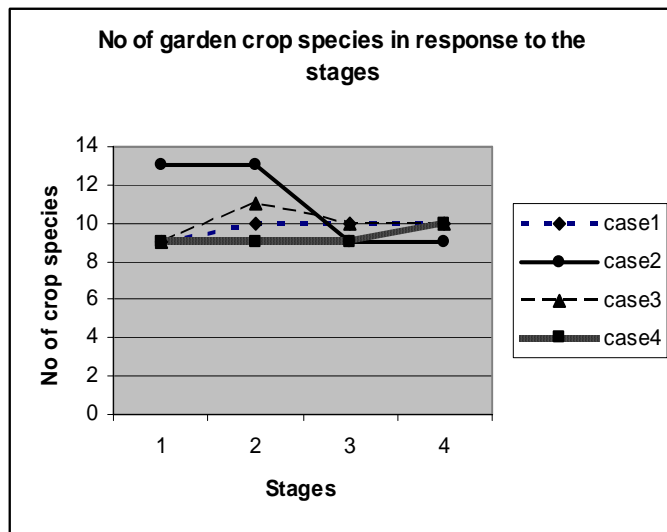
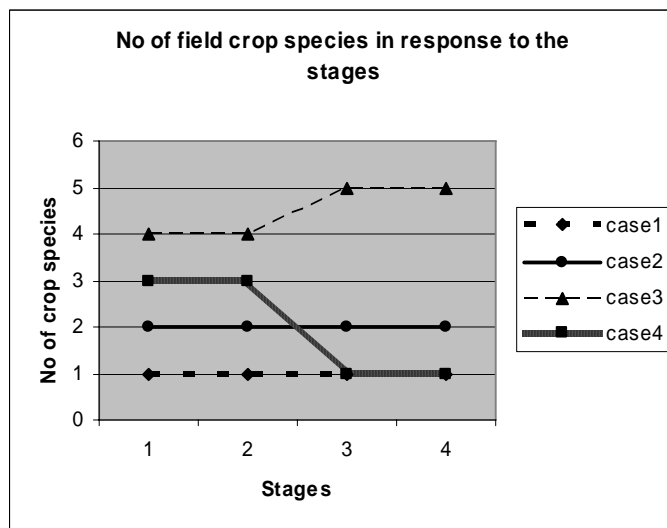


Figure 4. Male and female off-farm labor allocations across the stages, cases 1-4.

5a.



5b.



5c.

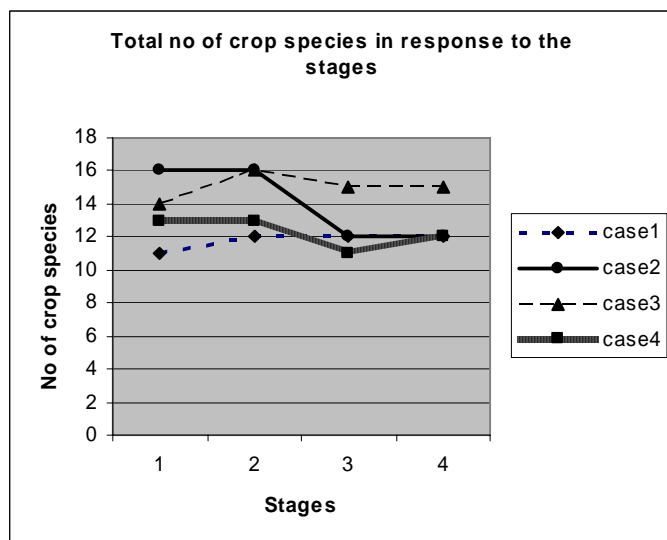


Figure 5. Crop diversity dynamics across the stages for the various plots, cases 1-4. The total includes coffee.

Table 1. Description of household characteristics

Household composition	Case 1 (single male parent): Meng				Case 2 (single female parent): Kalbi						Case 3 (absent single male parent): Oli					Case 4 (both parent deceased): Sam					
	pre-ill	illness fem	death fem	current	pre-ill	illness m	death m	re-marry	illness fem	current	pre-ill	illness fem	death fem	illness m	current	pre-ill	illness m	death m	illness fem	death fem	current
1. Period (yr)	94-6	99-04	2004	2004-5	92-94	94-99	1999	2001-2	2003-	2004-5	92-4	94-6	96	94-7	2004-5	<95	95-96	96	95-96	96	2004-5
2. Remarriage m	0	0	0	CL	1	0	NA	NA	NA	NA	1	0	0	0	CL	0	0	NA	NA	NA	NA
3. Remarriage fem	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	NA	NA
4. No. of children	0	3	2	0	2	3	3	4	3	2	0	1	1	1	1	4	4	4	4	4	3
5. Age children	NA	0.8-6	0.8, 6	0.8, 6	1, 4	2,7,12	2,7,12	1,4,9,14	2,5,11	7,12	0	0.6	0.6	1	7	1,4,8,9	2,5,9,10	2,5,9,10	2,5,9,10	2,5,9,10	13,17,18
6. Adult extended family member	0	1	1	0	0	0	0	0	0	0	0	3	3	3	3	0	0	2	2	2	2
7. Edu: no. child	NA	1	1	1	0	0	0	2	2	2	NA	NA	NA	NA	0	1	2	2	2	2	3
8. Child school dropouts	0	0	0	0	NA	0	0	0	1	0	NA	NA	NA	NA	NA	0	0	0	0	0	1
9. Migration	0	HH	0	0	0	0	0	0	0	0		1*			0	0	0	0	0	0	0
10. No. of children sent to orphanage	NA	0	2	NA				0					0					0			
11. Location resid.		Gomma					Gomma						Kersa					Gomma			
12. Distance from town (km)		5					13						18					14			
13. Year birth male		1975					1970						1971					1969			
14. Year birth fem		1977					1974						1976					1975			
15. Ethnicity		Dawro					Oromo						Oromo					Dawro			
16. Religion		Christian					Muslim						Muslim					Christian			
17. Education (yrs)																					
Male		8					8						8					9			
Female		4					2						5					5			

HH, m and fem refer to the household male and female respectively. NA means that the criterion is not applicable to the specific family. CL refers to common law partnership. *Male parent.

Table 2. Description of health status and HIV/AIDS

Health	Case1: Meng	Case 2: Kalbi	Case 3: Oli	Case 4: Sam
1. TB (frequency of occurrence)				
<i>Male</i>	0	0	0	1
<i>Female</i>	5	0	0	1
<i>Child</i>	1	0	0	1
2. Total duration of illness up to current time or death (yrs)				
<i>Male</i>	3	5	4	5
<i>Female</i>	6	2	3	4
3. Duration of severe illness before death (months)				
<i>Male</i>	NA	3	NA	6
<i>Female</i>	12	NA	12	8
4. HIV status				
<i>Male</i>	+	unknown	+	+
<i>Female</i>	+	+	+	unknown
<i>Child</i>	+	unknown	-	+(the late)
5. Mortality				
<i>No. of children died</i>	1	1	0	1
<i>Child age at death (yrs)</i>	0.8	2	0	9

+, - indicate that that the individual has been tested for HIV and proved to be HIV positive and negative respectively.

Table 3. Labor allocation patterns

Labor allocation	Case1 (single male parent): Meng				Case 2 (single female parent): Kalbi						Case 3 (absent single male parent): Oli					Case 4 (both parent deceased): Sam						
	pre-ill	illness fem	death fem	current	pre-ill	illness m	death m	re- marry	illness fem	current	pre-ill	illness fem	death fem	illness m	current	pre-ill	illness m	death m	illness fem	death fem	current	
<i>i. Own farm labor(days/yr)</i>																						
1. Male farm labor	30	30	30	40	160	60	0	0	0	0	120	60	0	0	0	20	0	0	0	0	0	
2. Female farm lab	10	0	0	0	60	30	80	80	60	50	80	0	0	0	0	10	0	0	0	0	0	
3. Child farm lab	0	0	0	0	0	0	12	12	10	12	0	0	0	0	0	0	0	0	0	30	40-60	
<i>ii. Off-farm emp. (days/yr)</i>																						
4. Male	240	180	130	180	110	0	60	60	0	0	100	60	260	260	260	240	100	0	0	0	0	
5. Female	50	0	0	0	0	0	90	90	0	0	0	0	0	0	0	250	150	0	0	0	0	
6. Child	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<i>ii. Casual labor hiring(days/yr)</i>																						
7. Labor hire-out	35	20	35	30	0	0	40	40	20	28	0	0	0	0	0	0	0	0	0	0	0	
8. Labor hire-in	0	0	0	0	0	0	5	5	5	7	0	0	0	0	10	30	25	15	15	15	15	
<i>iv. Sharecrop farming (ha)</i>																						
9. Share-out land	0	0	0	0	0	0	0.33	0.33	0.33	0.33	0	0	4	4	4	0.83	0.83	0.8	0.83	0.8	0.70	
10. Share-in land	0.25	0.25	0.25	0.25	0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 4. Household assets and endowments

Assets	Case1 (single male parent):Meng				Case 2 (single female parent): Kalbi						Case 3 (absent single male parent): Oli					Case 4 (both parent deceased): Sam					
	pre-ill	illness fem	death fem	current	pre-ill	illness m	death m	re-marry	illness fem	current	pre-ill	illness fem	death fem	illness m	current	pre-ill	illness m	death m	illness fem	death fem	current
<i>i. Land (ha)</i>																					
1. Title holder	m	m	m	m	m1	m1	m1	m1	m1	m1	m	m	m	m	m	m	m	m	m	m	C
2. Garden size	0.03	0.03	0.03	0.03	0.18	0.18	0.13	0.13	0.13	0.13	0.25	0.25	0.25	0.25	0.25	0.06	0.06	0.06	0.06	0.06	0.06
3. Field area	0	0	0	0	0.25	0.25	0.20	0.20	0.20	0.20	4	4	4	4	4	0.80	0.80	0.80	0.80	0.63	0.63
4. Coffee area	0	0	0	0	0.31	0.31	0.28	0.28	0.28	0.28	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1
Total land	0.03	0.03	0.03	0.03	0.69	0.69	0.60	0.60	0.60	0.60	17.50	17.50	17.50	17.50	17.50	1.88	1.88	1.88	1.88	1.69	1.69
5. Land confiscated	0	0	0	0	0	0	0.08	0.08	0.08	0	0	0	0	0	0	0	0	0	0	0.18	0
<i>ii. Livestock size</i>																					
6. Poultry	15	15	11	11	27	15	6	6	4	4	0	0	10	10	10	7-10	7-10	0	0	0	0
7. Sheep/ or goat	5	0	2	0	0	0	0	0	0.50	1.50	9	0	0	0	0	0	0	0	0	0	0
8. Oxen/ or bulls	1	0	0	0	1	0	0	0	0	0	5	5	2	2	2	3	3	0	0	1	1
9. Cow/ or heifer	2	0	0	0	1	0	0	0	0.50	0.5	10	10	8	3	3	14	10	4	4	0	0
10. Donkey/ or mule	0	0	0	0	0	0	0	0	0	0	4	4	2	2	2	0	0	0	0	0	0
<i>iii. Asset selling</i>																					
11. Land	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.13	0
12. Cattle	0	4	3	0	0	1	0	0	0	0	0	10	9	2	0	0	0	4	4	1	0
13. Jewel	0	1	0	1	0	0	0	0	0	0	0	0	0	2	2	0	0	0	1	5	0
14. Utensils	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0

M1 and C refer to the first male (in case of several husbands) and child respectively.

Table 5 Income(in 100 Br/yr), medical expenses (Br/yr) and consumption smoothing

Income and consumption	Case1 (single male parent): Meng				Case 2 (single female parent): Kalbi					Case 3 (absent single male parent): Oli					Case 4 (both parent deceased): Sam					
	pre-ill	illness fem	death fem	current	pre-ill	illness m	death m	illness fem	current	pre-ill	illness fem	death fem	illness m	current	pre-ill	illness m	death m	illness fem	death fem	current
1. Income																				
<i>Farm</i>	10	10	10	12	33	29	12	12	14	51	45	40	35	25	70	60	30	30	25	35
<i>Off-farm male</i>	40	22	22	25	14	8	0	0	0	40	45	27	27	27	40	40	0	0	0	0
<i>Off-farm female</i>	10	0	0	0	0	0	6	2	2	0	0	0	0	0	20	10	0	0	0	0
<i>Off-farm child</i>	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Off-farm total</i>	50	22	22	25	14	8	6	2	2	40	45	27	27	27	60	50	0	0	0	0
<i>Family support</i>	0	0	0	0	0	0	0	0	0	0	0	lb	lb	lb	0	0	0	lb	lb	lb
<i>HIV support</i>	0	12	12	12	0	0	0	12	12	0	0	14	14	14	0	0	0	0	0	0
<i>Total</i>	60	44	44	49	47	37	18	26	31	91	90	81	76	66	140	110	30	30	25	35
2. Medical expense																				
Household	0	4-600	0	50-100	0	500	300	200	100-150	0	400	360	100	360	0	2000	2000	2000	1200	0
Public	0	1200	0	0	0	0	0	0	0	0	0	300	2200	2200	0	0	500	0	0	0
3. Consumption smoothing																				
<i>Savings(Br/yr)</i>	120	0	100	100	400	0	0	0	0	600	100	0	0	0	3000	0	0	0	0	0
<i>Loan (Br/yr)</i>	0	890	0	0	400	0	150	150	300	800	800	800	800	800	0	0	0	100	400	200
<i>Int. rate(%/yr)</i>	NA	150	NA	NA	10	NA	200	200	200	10	10	10	10	10	NA	NA	NA	150	150	150
<i>Purpose loan</i>	0	fd+md	0	0	I	0	fd	fd	fd	I	I	I	I	I	0	0	0	md	md	fd
<i>Food shortage months</i>	0	0	0	0	0	0	2.5	4	4	0	0	0	0	0	0	0	0	3	2.5	2

fd, md, and I refer to food consumption, medical expenses, and farm inputs respectively and lb refers to labor. Current exchange rate: USD1=Br 8.6.

Table 6. Land allocations to crops (ha) no. of plants (#) or quantity produced in kgs (where indicated)

Crop choice and diversity	Case1 (single male parent):Meng				Case 2 (single female parent): Kalbi					Case 3 (absent single male parent): Oli					Case 4 (both parent deceased): Sam					
	pre-ill	illness fem	death fem	current	pre-ill	illness m	death m	illness fem	current	pre-ill	illness fem	death fem	illness m	current	pre-ill	illness m	death m	illness Fem	death fem	current
Garden crops																				
<i>Sugarcane</i>	0	0	0	0	0.08	0.13	0	0	0	0.13	0.08	0	0	0	0	0	0	0	0	0
<i>Qat</i>	0	0	0	0	0	0	0	0	0	0.08	0.08	0.08	0.08	0.08	0.06	0.06	0.06	0.06	0.06	0.06
<i>Maize local</i>	0.03	0.03	0.03	0.03	0.03	0.03	0.1	0.1	0.1	0.2	0.2	0.08	0.08	0.08	0	0	0	0	0	0
<i>Sorghum anchro</i>	0	0	0	0	0.03	0.03	Am	Am	Am	0.05	0.05	0	0	0	0	0	0	0	0	0
<i>Beans</i>	0	0	0	0	Im	Im	Im	Im	Im	0	0	0	0	0	0	0	0	Im	0	0
<i>Castor bean(#)</i>	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
<i>Taro(kg produce)</i>	100	100	50	50	150	150	50	50	50	0	0	0	0	0	0	0	0	0	0	0
<i>Yam(kg produce)</i>	50	50	10	10	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Other (kale, onion, garlic, kg)</i>	0	0	0	0	10	10	0	0	20	0	10	0	0	0	0	0	0	0	0	0
<i>Enset geno(#)</i>	2	5	9	9	60	30	10	10	13	0	40	50	53	53	0	0	0	0	0	5
<i>Enset anchiro(#)</i>	0	0	2	2	5	5	2	2	2	0	0	0	0	0	0	0	0	0	0	0
<i>Enset Nobo(#)</i>	0	0	0	0	0	0	0	0	0	0	0	50	50	50	0	0	0	0	0	0
<i>Coffee local(#)</i>	0	0	0	0	40	40	40	40	40	50	50	50	50	50	12	12	12	12	12	12
<i>Coffee Hyv(#)</i>	0	0	0	0	20	20	20	20	20	0	0	0	0	0	0	0	0	0	0	0
<i>Papaya(#)</i>	6	6	10	10	10	10	10	10	0	2	2	14	14	14	12	12	12	12	10	2
<i>Orange(#)</i>	2	2	3	3	5	6	6	6	6	11	11	11	3	3	2	2	2	2	2	7
<i>Mango(#)</i>	0	1	1	1	3	3	3	3	3	2	2	7	7	7	1	1	1	1	1	4
<i>Guava(#)</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	5
<i>Avocado(#)</i>	0	0	0	0	0	0	0	0	0	0	0	4	4	4	5	5	5	5	5	1
<i>Pineapple(#)</i>	2	2	2	2	0	0	0	0	0	0	0	0	0	0	3	3	10	10	10	10
<i>Banana habesha(#)</i>	30	30	8	8	20	20	0	0	0	50	50	50	50	50	5	5	5	5	5	7
<i>Banana Kenya(#)</i>	0	0	0	0	20	20	0	0	0	100	100	100	100	100	0	0	0	0	0	0
<i>Garden no. of sp.</i>	9	10	10	10	13	13	10	10	10	9	11	10	10	10	9	9	9	9	9	10
Field crops																				
<i>Maize local</i>	0.25	0.25	0.25	0.25	0	0	0.08	0.08	0.08	0	0	0	0	0	0	0	0.31	0.31	0.31	0.31
<i>Maize BH660</i>	0	0	0	0	0.08	0.08	0	0	0	0.8	0.8	0.8	0.25	0.25	0.63	0.63	0.31	0.31	0.31	0.31
<i>Maize BH140</i>	0	0	0	0	0.07	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0

<i>Sorghum anchiro</i>	0	0	0	0	0.13	0.13	0.13	0.13	0.10	0.50	0.50	0.50	0.50	0.50	am	am	am	am	am	am
<i>H. Beans</i>	0	0	0	0	0	0	0	0	0	IM	IM	IM	IM	IM	0	0	0	0	0	0
<i>Teff</i>	0	0	0	0	DM	0	0	0	0	0.50	0.50	0.50	0.50	0.50	0	0	0	0	0	0
<i>Pepper</i>	0	0	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0	0	0
<i>Banana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07	0.07	0	0	0	0
<i>qat</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.08	0.08	0	0	0	0
<i>Taro</i>	0	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.12	0.12	0	0	0	0	0	0
<i>Fallow</i>	0	0	0	0	0	0	0	0	0	0	0	0	0.38	0.38	0	0	0	0	0	0
<i>Field no of species</i>	1	1	1	1	2	2	2	2	2	4	4	4	4	4	3	3	1	1	1	1
Coffee	0.13	0.13	0.13	0.13	0.33	0.33	0.33	0.33	0.28	0.13	0.13	0.13	0.13	0.125	1	1	1	1	1	1
<i>Coffee local</i>	0.13	0.13	0.13	0.13	0.33	0.33	0.33	0.33	0.28	0.13	0.13	0.13	0.13	0.125	1	1	1	1	1	1
<i>Coffee Hyv(#)</i>	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Am, At, As, Dm, and Im refer to the crop alternating with maize, alternating with teff, alternating with sorghum, double cropping with maize, and intercropped with maize respectively. The measures for field crops and coffee in the case of Meng refer to the crops on the land that is hired-in under sharecropping.

NB: the re-marriage column has been left out because no change has been observed form that of the death column.

Table 7. Changes in labor allocation patterns

ΔLabor allocations	Case1 (single male parent): Meng				Case 2 (single female parent): Kalbi					Case 3 (absent single male parent): Oli					Case 4 (both parent deceased): Sam						
	pre-ill	illness fem	death fem	current	pre-ill	illness m	death m	re-marry	illness fem	current	pre-ill	illness fem	death fem	illness m	current	pre-ill	illness m	death m	illness fem	death fem	current
<i>i. Own farm</i>																					
Male		0	0	+		-	-	-	-	-		-	-	-	-		-	-	-	-	-
Female		-	-	-		-	+	+	0	-		-	-	-	-		-	-	-	-	-
Child		NA	NA	NA		NA	+	+	NA	NA		NA	NA	NA	NA		NA	NA	NA	NA	+
<i>ii. Casual labor</i>																					
Hire-out		-	+	+		0	+	+	+	+		0	0	0	0		0	0	0	0	0
Hire-in		0	0	0		0	+	+	+	+		0	0	0	+		0	-	-	-	-
<i>iii. Off-farm</i>																					
Male		-	-	-		-	-	-	NA	-		-	+	+	+		-	-	NA	NA	NA
Female		-	NA	NA		0	+	+	+	+		0	NA	NA	NA		0	-	-	NA	NA
Child		NA	NA	NA		NA	NA	NA	NA	NA		NA	NA	NA	NA		NA	NA	NA	NA	0
<i>iv. Sharecropping</i>																					
Hire-out land		0	0	0		+	+	+	+	+		0	+	+	+		0	0	0	0	+
Hire-in land		0	0	0		-	-	-	-	-		0	0	0	-		0	0	0	0	0

0,+, and - denoting no change, an increase, and a decrease respectively.

Table 8. Changes in crop choice and diversity

Δ Crop choice	Case 1 (single male parent): Meng				Case 2 (single female parent): Kalbi					Case 3 (absent single male parent): Oli					Case 4 (both parent deceased): Sam						
	pre-ill	illness fem	death fem	current	pre-ill	illness m	death m	Re-marry	illness fem	current	pre-ill	illness fem	death fem	illness m	current	pre-ill	illness m	death m	illness fem	death fem	current
<i>i. Garden</i>																					
<i>No of species</i>		+	+	+		0	-	-	-	-		+	+	+	+		0	0	0	0	+
<i>Replaced species</i>		0		0		0	0	0	0	0		0		0			0				0
<i>No of variety</i>		0	+	+		0	0	0	0	0		0	0	0	0		0	0	0	0	0
<i>Replaced variety</i>		0	0	0		0	0	0	0	+		0	0	0	0		0	0	0	0	0
<i>ii. Field</i>																					
<i>No of species</i>		0	0	0		0	0	0	0	0		0	0	0	0		0	-	-	-	-
<i>Replaced species</i>		0		0		0				0				0			0				0
<i>No of variety</i>		0	0	0		0	0	0	0	0		0	0	0	0		0	0	0	0	0
<i>Replaced variety</i>		0	0	0		0	+	+	+	+		0	0	0	0		0	+	+	+	+
<i>Coffee no. of variety</i>		+	+	+		0	0	0	0	0		0	0	0	+		0	0	0	0	0
<i>Fruit planting</i>		+	+	+		0	0	0		0		+	+		+		0	+			+