THE LONGITUDINAL IMPACT OF HIV AND AIDS ON RURAL LIVELIHOODS IN EAST AFRICA

By Kenneth Ekoru, Dominic Bukenya, Tom Lutalo, Adam Pain and Janet Seeley

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Kenneth Ekoru,1 Dominic Bukenya,1 Tom Lutalo,2 Adam Pain3,4 and Janet Seeley1,3

1. MRC/UVRI Uganda Research Unit on AIDS, Uganda
2. Rakai Health Sciences Programme, Uganda
3. School of International Development, University of East Anglia, UK
4. Swedish University of Agricultural Sciences, Uppsala, Sweden

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Abbreviations

AIDS Acquired Immune Deficiency Syndrome
ART Anti-retroviral therapy
GPC General Population Cohort (MRC)
HIV Human Immunodeficiency Virus
MRC Medical Research Council
RCCS Rakai Community Cohort Study
RHSP Rakai Health Science Programme
UVRI Uganda Virus Research Institute

N.B. In this report we use the abbreviation ‘HIV’ to refer to what is often termed the HIV/AIDS epidemic because to have AIDS means that one must have HIV. Therefore we refer to the HIV epidemic. The term ‘AIDS’ is used when we want to highlight AIDS-related illness or mortality, as a specific condition in addition to HIV infection.
Acknowledgements

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Summary

The overall purpose of this study was to analyse the trajectories of households and communities affected by HIV and AIDS in Uganda and look at the impact of the epidemic on agriculture and rural livelihoods over the past 20 years. Understanding the long-term impact of the epidemic is central to the design of effective policies and programmes for impact mitigation. We analyse data from the General Population Cohort (GPC) of the MRC/UVRI Uganda Research Unit on AIDS (in Masaka District) and the Rakai Community Cohort Study (RCCS) of the Rakai Health Sciences Programme (in Rakai District), both of which have been in existence for over 15 years, and in which demographic data have been collected on an annual basis. The GPC covers 25 contiguous villages (20,000 people of all ages) and the RCCS covers 50 villages (12,000 and 16,000 people aged 15-49) scattered throughout Rakai District. We also draw on new data collection with 200 households, undertaken for this study on the farming systems in the GPC study area.\(^1\) We begin by situating the data within the broader context of changes that have taken place in the two Districts over the last two decades, and reflect on what we mean by ‘impact’.

In the mid-1980s, south west Uganda and adjacent areas were often referred to as “the epicentre” of the African HIV epidemic. There were very real concerns at that time about the effects of HIV on agricultural systems and, specifically, on food production and food security. Much of the commentary on the impacts of HIV on reducing household food security has assumed a direct linear connection between AIDS-related illnesses leading to a loss of household labour, resulting in reduced area of land cropped and causing a fall in crop production, resulting in food insecurity. It also assumed that HIV is the primary causal factor leading to this food insecurity, overlooking pre-existing conditions before the onset of an AIDS-related illness in an affected household. We would suggest, based on our research, that not only are there household specific circumstances but there are wider circumstances and other drivers of change in the rural economy that need to be factored into building an understanding of household specific cause-effect relations related to HIV impact. Time is also important: when the AIDS-related illnesses or death occurred and to whom, and how long the illnesses continued can all affect the short and long term impact on household members. If prolonged illness followed by the death of a male or female household head coincided with a crop pest outbreak then there may be very negative outcomes with respect to household food security, at least in the short and medium term. In addition household members may respond to each specific effect of HIV, or other short or long term crisis, through adaptive practices, thus weakening the strength of the implied cause-effect relation between one effect and another. These potentially may set the household onto a different trajectory whereby the effects of an AIDS-related illness are progressively moderated and thus lead to household recovery from the immediate effects. Household members are also likely to draw on social resources from outside their immediate household to assist, blurring the lines between one household and another. This last point is important and raises the issue of the utility of the household as the unit of analysis, because the

\(^1\) Note that analysis of new data from 100 households in the RCCS, from the Rakai Health Sciences Programme, has not been included in this report.
links to other family members and social networks are not taken into account when the individual household is the sole focus.

Not only have political, social and economic changes occurred in the two Districts, following the establishment of the present Government in 1986, but the study areas have also experienced long term and dynamic trends in agriculture, both crops and livestock, driven by price and disease.\(^2\) In addition, there has been a long term trend of the increasing importance of non-farm income, thus reducing the significance of on-farm production for food security. The HIV-epidemic needs to be seen within this broader context of change.

Turning to the GPC data, we focused our analysis on HIV and AIDS impacts on household demography, socio-economic status, school attendance and fostering practices, as well as the effects on land cultivation, cropping patterns and livestock. We compared HIV-infected (where an AIDS-related death had occurred) with uninfected households. We found that in practice many of the households thought on the basis of annual survey data to be ‘HIV-infected’ (because there had been one or more AIDS-related deaths) were no longer ‘HIV-infected’. This was because these households had re-formed as children grew up or people moved in and so the household members had ‘lost’ the direct association with the previous HIV-positive classification.

When data collection began in both cohorts in the early 1990s, the HIV epidemic was at its peak (prevalence was over 9% for the GPC and over 17% for the RCCS). Between 1990 and 2000 HIV prevalence declined for both males and females in Masaka and Rakai. In terms of demographic structure in both populations roughly half the population has been below 15 years throughout the study period. It is not surprising, therefore that the dependency ratio is high: in the GPC it was 142 at baseline in 1990 and 135 in 2008. However we found differences in household structures between HIV-infected and HIV-uninfected households with dependency ratios in HIV-infected households rising to become consistently above the dependency ratio in HIV-uninfected households from 1996/97 to 2003/04. This was surprising.

With respect to household size the evidence does not point to major changes or differences between HIV-infected and uninfected households. The data on school drop-outs also show no marked difference in the proportion of children who drop out of primary school when we compare HIV-uninfected and HIV-infected households. The number is on the decline for both categories of households, probably due to the introduction of Universal Primary Education, although our data show that the number of school drop-outs was already declining before the introduction of Universal Primary Education, this may have been because of increased interest in education as an investment for the future.

When we looked at child fostering in the GPC we found that more children have been fostered in HIV-infected households than in HIV–uninfected households in absolute terms. Over time there has been little different between HIV-infected and HIV-uninfected households. In HIV–

\(^2\) The two large Districts of Rakai and Masaka have undergone a series of sub-divisions since 2007. We refer to the area covered by the two Districts prior to the changes that began in 2007 in this report. The process if District formation is documented at [http://www.statoids.com/uug.html](http://www.statoids.com/uug.html) (accessed 9th October 2010).
infected households the average number of children fostered has been fairly stable at about 2.4 children per household over time although it is beginning to decline. For HIV-uninfected households the average number of children fostered fell from 3.4 in 1991 to 1995 to 2.3 in 2001, and has since 2002 stabilized at about 2.4 children per household.

As regards socio-economic status we found, again using the GPC data, that the proportion of those with low socio-economic status within HIV-infected households was lower than the same proportion among HIV-uninfected households in all the periods. The proportion of households with high socio-economic status was higher among HIV-infected households from baseline to 1996/97. In 2000/01 and 2005/06 the proportion was higher among HIV-uninfected households. These results show that in this rural setting relatively wealthier households were more likely to experience HIV infection at the beginning of the epidemic.

Our findings on school drop-outs, fostering and socio-economic status show a mixed picture. The patterns of school drop-outs and fostering show no direct link to HIV-infection. The findings on socio-economic status do appear to show some impact from HIV-infection but it is difficult to know quite why this is so without knowing more about the details of the position of the person in the household who was infected, and also the support different households may have received from outside, which may have mitigated the impact of AIDS-related illness and death in the short-term.

We then examined the impact of HIV on crop production in the GPC study area by analyzing the overall trend taken by acreage cultivated for all households and then making a comparison between HIV-infected and HIV-uninfected households. The average land under cultivation was higher in HIV-infected households at baseline, 3.5 acres compared to 3.0 for HIV-uninfected households, possibly because of their higher socio-economic status (as noted above). However the average area under cultivation for infected households decreased over time and in 2008 it was the same as the average acreage under cultivation in HIV-uninfected households, at 3.0 acres per household.

Coffee together with beans, matooke (banana) and maize were the major crops grown by the households at the GPC baseline. Coffee being entirely a cash crop while the others were mainly food crops for home consumption. There is however evidence that over time the importance of coffee as a major crop has reduced while beans and maize have grown in importance as major crops. The proportion of households that grew matooke as the major crop remained largely unchanged but there is evidence to suggest that the percentage of households in which the crop was the second major crop has reduced. Even for households that did not change their major crop to beans or maize, they said they had increased their production of these crops.

When we looked at individual crops we found that HIV-uninfected households were slightly more likely to grow beans than HIV-infected households while the reverse was true for maize. After the initial 5-10 years of the cohort when HIV-infected households were more likely to grow coffee (which may have been linked to socio-economic status), there has been little difference in coffee-cultivation between the two categories of household since 2000.
While our findings suggest some link before HIV-infection and crops grown, in the case of maize and beans which may be related to labour constraints, the picture is not clear. Loss of labour could be as much due to household members migrating to urban areas or to the shores of Lake Victoria for work, as to illness and death due to HIV. Pests, diseases and prolonged dry spells affected all households, but may have affected some households more severely because of the crops or cropping area they had, so this makes attribution difficult.

It is important to stress that our conclusions are not only preliminary (data analysis continues) but conclusions drawn from these data are specific to the location of study and should not be generalised beyond this context without careful consideration. With those caveats in mind we suggest that the evidence does not show a direct linear connection between HIV and outcomes across all the factors we have explored. Accordingly HIV impacts have not been as direct, or as catastrophic, at the community level as had been anticipated. What this indicates is that the wider context is important, with HIV being one factor among many that has shaped household livelihood trajectories. Households, and more particularly the wider social networks which link different households, may be much more resilient on the whole than had been expected.

What does this suggest for policy? Firstly, the HIV-epidemic has not happened in isolation; other factors such as climatic variation, pests and diseases, growing land pressures, broader changes in the economy and increasing availability of public goods, notably education, have and continue to have an impact on and drive change in rural livelihoods. Policy interventions outside agriculture and health have had an impact on households. The increased availability of primary education, because of Universal Primary Education, has most obviously affected school enrolment and drop-outs but also affected labour availability in some households. The perceived impacts of the HIV-epidemic cannot therefore be addressed in isolation from these other drivers.

Secondly, and linked to this, it is important that HIV-related interventions are not based on deterministic models of path dependency, simply assuming that once a household has or had a member who is HIV-positive a certain outcome is, or prior to anti-retroviral therapy was, almost inevitable. This is clearly not the case. Rather the evidence points to more evolutionary patterns of path dependency and a capacity of household members, and their broader social networks, to respond both to the negative effects of HIV as well as other both negative and positive drivers of change in their immediate environment.
Introduction

The overall purpose of this study was to analyze the trajectories of households and communities affected by HIV in Uganda and the impact of the epidemic on agriculture and rural livelihoods over the past 20 years. Understanding the long-term impact of the epidemic is central to the design of effective policies and programmes for impact mitigation.

As the HIV epidemic intensified in the 1990s, a growing number of studies documented aspects of its impact on households, businesses and national economies. However many of the initial studies of rural societies and of the impact of HIV were based on short-term cross-sectional data sources from which long-range conclusions and generalizations were made. This was partly due to the fact that, for many years, resources were concentrated on demonstrating the effectiveness of awareness and education programmes rather than supporting longitudinal research that might have provided information on impact.

The complexity of determinants of household vulnerability to HIV and the capacity to moderate or recover from the impact of AIDS-related illness and the trajectories such recovery (or none thereof) take, remain unclear. Similarly, less is known about the long term effects of HIV on household agricultural practices, farm productivity and household livelihoods and how they might affect wider community relationships, operations, systems and structures, although recent research has begun to provide some answers (Seeley et al. 2010, Barnett et al. 2010, Yajima et al. 2010).

This study sought to illuminate the long term impact of the epidemic using data from the General Population Cohort (GPC) of the MRC/UVRI Uganda Research Unit on AIDS and the Rakai Community Cohort Study (RCCS) of the Rakai Health Sciences Programme. The background to both cohorts is described below.

MRC/UVRI GPC population

The Medical Research Council/Uganda Virus Research Institute Uganda Research Unit (MRC/UVRI) on AIDS was established in 1988 based on a bilateral agreement between the Ugandan and British Governments. It is a multi-disciplinary research programme for the study of HIV infection in Uganda. The General Population Cohort (GPC) study was established in 1989 in 15 rural villages (expanded to 25 villages in 2000) in a sub-county in Masaka district in south-western Uganda. This is an open cohort, allowing in-migrants and children born into the cohort to join. The total population covered, with no age limit, is about 20,000 people. The main objectives of the study are to describe the dynamics of HIV infection within a rural population, to identify the major risk factors for contracting HIV, to quantify the impact of HIV infection on mortality and fertility and to study treatment seeking behaviour. Every year since its inception, the GPC team has conducted annual household censuses of the resident population that collect age, sex, education, and relationship to household head among other variables, and an adult medical sero-survey of all willing residents aged 13 and above including collection of blood specimens for HIV testing and a brief behavioural questionnaire. Every four years, starting at baseline, information is collected on socio-economic status using a list of household assets. The annual surveys are well accepted by the population, with coverage of 60–70% of the resident
population in any given year. A number of sub-studies are linked to the GPC. One sub-study is the Rural Clinical Cohort (RCC), in which several hundred members of the GPC, consisting of people living with HIV in 1989/1990 (round 1) and all HIV incidence cases after that round and matched controls, are followed up more intensively. Participants in the RCC are asked to come for regular, three monthly, clinical visits. The cohort is funded by the Medical Research Council of the UK Government.

**The Rakai Health Sciences Programme (RHSP) Study population**

The Rakai Health Sciences Programme, initiated in 1987 in Rakai District south western Uganda, is a collaboration between the Ministry of Health through the Uganda Virus Research Institute and researchers at Makerere and the Johns Hopkins Universities. The core of the Rakai Programme has been the Rakai Community Cohort Study (RCCS). The current 50 village cohort was established in 1994/5 based on an earlier smaller cohort. All participants are followed annually in their respective homes, at which time they provide survey information (demographics, education, current and past sexual behaviours and STI history) and biological samples for detection of HIV, STDs and other infections. This is an open cohort of adults aged 15-49 years, which enrolls new in-migrants and newly age-eligible residents at each annual survey visit. The open cohort structure maintains the number of participants under surveillance at between 12,000-16,000 annually. During each annual visit household information (for both new and old households) is collected. This consists of location of household, members within each household (includes movement if any or death of members), relationship to head of household, household characteristics and possessions, sources of water and animals being reared. Funding was received from National Institutes of Health (US Government) and currently from the Bill and Melinda Gates Foundation to continue with the cohort. To support the biomedical research efforts, the Programme established a full-time social science team which conducts qualitative research via focus groups and in depth interviews, in order to facilitate the planning, conduct and interpretation of the Programme studies. Using these descriptive epidemiologic, behavioural and qualitative studies, the Rakai Programme documents the epidemic and elucidates risk factors and patterns of heterosexual transmission in this part of the country.

While the data collected by the two cohorts are similar, there are two important differences between the GPC and the RCCS. The GPC is concentrated in one sub-county of Masaka District, working in contiguous villages, while the RCCS study communities were selected to represent different parts of the District, so are scattered across the area. Secondly, the GPC includes all age groups, from infants to the very old. The RCCS focuses data collection on the age group 15-49 years.

**Purpose of this study**

The overall purpose of this study, as stated above, is to analyze the trajectories of households and communities affected by HIV and AIDS and the impact of HIV and AIDS in Uganda on agriculture and rural livelihoods for the past 20 years, in order to understand the long-term impact of the epidemic and to contribute to the design of policies and programmes for impact mitigation.
Research questions

1. What has been the impact of the AIDS epidemic on household demographic structure and what implications has this had for household human capital (labour availability, skills, education, health)?

2. What has been the impact of the epidemic on utilization of land by households, including the substitution processes involved, and what has this implied in terms of land productivity, cropping patterns, and household food security?

3. What has been the implication of illness and deaths on social and economic well-being of surviving household members (especially vulnerable groups such as orphans, widows, and the elderly)?

4. How have individuals/households/communities responded to the epidemic and what have these trajectories meant in terms of household and community viability over time?

5. Has the availability of ART modulated the impact of the epidemic on households, and if so, how has this been accomplished?

6. How has the epidemic affected fish-based livelihoods across the whole range of the supply chain (fishing, fish processing and fish trading)?

Questions one, three, four and five are addressed through the analysis of existing data, new data collection has been undertaken in order to answer question two. Question 6 will be addressed by the MRC team through the analysis of data collected in a project funded by the European and Developing Countries Clinical Trials Partnership (EDCTP) which focuses on five fishing sites in Masaka and Wakiso districts.3

Before presenting an overview of our findings, we present some background to the study of ‘impact’, some reflections on causality and then information on the wider context of social change in Uganda, all of which provide the context in which our answers to the questions above, which follows, can be understood.

---

3 The EDCTP-funded HIV and Fishing project, full title: ‘Prospective cohort study to determine HIV incidence, risk factors for HIV infection, describe the molecular epidemiology and the social and behavioural characteristics in fishing populations of two lakeshore districts in Uganda in preparation for future HIV prevention research’.
Thinking about HIV Impact

Understandings of HIV Impact

In the mid-1980s, south west Uganda and adjacent areas were often referred to as “the epicentre” of the African HIV epidemic. Sero-prevalence in some communities approached 30 per cent of the population (Serwadda et al. 1985, Hudson et al. 1988) and there were grave concerns about the impact of the epidemic on society (Gregson et al. 1994). As we have described elsewhere (Seeley et al. 2010, Barnett et al. 2010) there was some work at that time to explore what the impact might be. The Food and Agriculture Organisation of the United Nations, for example, commissioned a small scale desk simulation study of the potential impact on an African rural society using an unrelated agricultural economic dataset from Rwanda (Gillespie 1989). More detailed speculation about the potential effects of HIV on rural society appeared in 1988 (Abel et al. 1988). In 1989 there was a detailed study in Rakai District which looked at the effects of HIV and AIDS (Barnett et al. 1990). There were very real concerns at that time about the effects of HIV on agricultural systems and, specifically, on food production and food security (Over 1992; Abel et al. 1988). Gillespie (1989) suggested that labour shortages because of the mortality of adults, and a shortage of child labour because of infant mortality, would have an impact on area cultivated, cropping patterns, soil fertility and the control of crop pests and diseases. Subsequently detailed research by Rugalema (1999) and Baylies (2002) documented some of these impacts in rural communities in Tanzania and Zambia, respectively, drawing the attention to the need for community safety nets to provide ‘emergency relief, rehabilitation and development’ (Baylies 2002: 611).

In 2002 the Ministry of Agriculture, Animal Industry and Fisheries in Uganda conducted a study looking at the impact of the epidemic on agricultural production in the country. From a study of 313 households in four districts (Rakai, Lira, Iganga and Mbarara) they concluded that

\[
\text{HIV/AIDS has changed family structure with able-bodied members dying, leaving the very young ones and elderly [...] agriculture which absorbs the biggest proportion of the workforce, and constitutes the single most [sic] source of people's livelihood is being threatened by HIV/AIDS. (2002: 4).}
\]

Jefferis et al. (2007) in their review of the macroeconomic impact of HIV in Uganda drew the same conclusion:

\[
\text{AIDS undermines agricultural systems, affects the nutritional situation and food security of rural families. Families face declining productivity as well as loss of knowledge about indigenous farming methods and loss of assets. (2007: 47)}
\]

We would suggest that these statements on impact, and indeed Gillespie’s forecast of labour shortages, are based on a debatable set of assumptions about causalities or cause-effect relations. In the two studies in Uganda which we cite above signs of change in household structure and farming systems are linked closely to HIV leading, to rather simplistic assumptions that where a person in a household is infected by HIV that household becomes locked into an inevitable trajectory of change, which they have no capacity to moderate. In addition, as Chapoto and Jayne (2008) have observed there is a need to separate the short-term impacts of
HIV and AIDS morbidity and mortality at the household level, which can undoubtedly be severe, from the longer-term impacts aggregated over larger populations.

While the short-term impact of an AIDS-related death on a household may be obvious because of the withdrawal of labour from agriculture and the loss of resources as health care expenses are met, the longitudinal impact of the HIV epidemic is harder to assess. The reason for this is summed up in the brief discussion by Booysen and Arntz (2003: 2399) on the importance of longitudinal studies to look at impact. Through such studies one may not only focus on the effects of the epidemic but also:

`the combined impact of HIV/AIDS and other impacts on communities can be assessed over time as these factors change although it is in most cases very difficult to distinguish between the impact of HIV/AIDS and that of wider impacts.'

Investigating Causalities

As noted above, it has been suggested that much of the commentary on the impacts of HIV on reducing household food security has assumed a direct linear connection between AIDS-related illnesses leading to a loss of household labour, resulting in reduced area of land cropped and causing a fall in crop production giving rise to food insecurity. It also assumes that HIV is the primary causal factor leading to this food insecurity and that the household is a self-contained unit. While this may be the case under certain circumstances, there are grounds for questioning the universality of these assumptions and testing more explicitly the cause effect relations implied in what might be called the ‘simple’ model of HIV impact – that is AIDS-related illness causes food insecurity.

First the ‘simple’ model leaves no room for household responses to cope (live with the effects through drawing down on other non-essential household assets), mitigate (seeking to reduce the immediate impacts of an effect) or adapt (through a strategic decision to expand non-farm income, for example) to the effects of a member of the household succumbing to AIDS-related illness. Second and related there is an important time dimension to the onset of an occurrence of opportunist infections and AIDS-related illnesses with the possible outcome in death, thus in a sense making the experience a long duration stress rather than necessarily a shock, and therefore a stress to which households potentially can adapt. Third it is far from clear that evidence of changes in crop composition or crop area are necessarily a robust indicator of the simple model, not least as will be discussed below with respect to Uganda because there are other reasons that drive changes in crop production. Fourth there is an assumption that rural livelihoods are agricultural livelihoods and households obtain food security through their own farm production. Thus the simple model does not allow for other means of meeting food security. There is a considerable body of evidence that challenges the assumption of livelihoods being agriculturally based in East Africa (Ellis and Bahiigwa 2003, Ellis and Freeman 2004, among others). Finally, there is the empirical evidence, outlined in this report that not only indicates that the impact envisaged by the simple model has not been realised but provides indicative evidence of adaptive practices by households. This is the insight that longitudinal monitoring of HIV-infected households can offer in contrast to cross sectional surveys.
As a step to thinking through and testing the assumed cause-effect linkages a conceptual framework of a causality map is proposed that teases out in detail the potential linkages between the onset of an AIDS-related illness and its immediate and consequent effects as they work their way through over time. This is not to state that these effects necessarily happen but it provides a thinking tool to explore systematically what household members might do once there is the onset of an AIDS-related illness in the household. The causality map is outlined in Figure 1.
**Figure 1: Outline Causality Map for assessing HIV Impacts on Household Food Security**

<table>
<thead>
<tr>
<th>Level Minus Zero</th>
<th>Zero</th>
<th>Level One</th>
<th>Level Two</th>
<th>Level Three</th>
<th>Level Four</th>
<th>Level Five</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Effect</td>
<td>Effect</td>
<td>Effect</td>
<td>Effect</td>
<td>Effect</td>
</tr>
<tr>
<td><strong>Pre AIDS status</strong></td>
<td><strong>Onset AIDS-related illness</strong></td>
<td><strong>Cannot work / sick</strong></td>
<td><strong>Medical costs</strong></td>
<td><strong>Loss of Agric labour</strong></td>
<td><strong>Reduced land cultivation</strong></td>
<td><strong>Less Production</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Care Costs</td>
<td></td>
<td>Loss remittance income</td>
<td>Less intensive Cropping</td>
<td>Income Decline</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increased HDR</td>
<td></td>
<td></td>
<td></td>
<td>Decline Hhld economy</td>
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<td></td>
<td></td>
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<tr>
<td><strong>Households &amp; their livelihood security (poverty status)</strong></td>
<td></td>
<td>Relocate sick person</td>
<td>Hire labour</td>
<td>Reduce HDR – foster out, children to relatives etc</td>
<td>Alternative Income,</td>
<td>More off farm</td>
</tr>
<tr>
<td>- household assets</td>
<td></td>
<td></td>
<td>Reduce expenditure</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- household composition &amp; dependency ratios</td>
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**Household response effects from immediate resources of coping / mitigation/ adapting reducing AIDS effects**

**Medical Intervention Effects** ➤ **Weaken HIV impact links** ➤

**HIV AIDS effects on household – over time** ➤

- household assets
- household composition & dependency ratios

- HIV AIDS effects on household – over time

- Pre AIDS status

- Onset AIDS-related illness

- Cannot work / sick

- Medical costs

- Care Costs

- Increased HDR

- Loss of Agric labour

- Loss remittance income

- Reduced land cultivation

- Less intensive Cropping

- Less Production

- Income Decline

- Decline Hhld economy

- Relocate sick person

- Hire labour

- Reduce expenditure

- Reduce HDR – foster out, children to relatives etc

- Alternative Income, 

- More off farm
<table>
<thead>
<tr>
<th>Drivers of Change</th>
<th>Economic</th>
<th>Education</th>
<th>Crop prices and diseases</th>
<th>Shrinking farm sizes</th>
<th>Soil Fertility</th>
<th>Risks &amp; Hazards-drought/ conflict/ other illness</th>
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<tr>
<td><strong>Driver of Change Effects</strong></td>
<td>Reinforce HIV impact links ▲/ Weaken HIV impact links ▼</td>
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<tr>
<td><strong>Risk and Hazard Effects</strong></td>
<td>Reinforce HIV impact links ▲</td>
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- household income portfolios
  - Draw on social resources ▼
  - Draw on social resources ▼
  - Draw on social resources ▼
  - Draw on social resources ▼
  - Draw on social resources ▼

**Household response effects from external resources/community**
The causality map, firstly, specifically draws attention to the pre-existing conditions, both internal and external, before the onset of an AIDS-related illness in the household. Not only are there household specific circumstances but there are wider circumstances and other drivers of change in the rural economy that need to be factored into building understanding of household specific cause-effect relations in relation to AIDS impact. In short, context matters.

It is important to draw attention to the time dimension through which effects are played out which may be either over the short or long term. Context matters here too and one might expect there to be a difference between say the double cropping agricultural environments of central/south western Uganda and the drier single cropping regimes elsewhere. Also account has to be taken of other events – an unrelated death or a second member being affected by AIDS-related illness, a drought or a crop pest outbreak – which might confound detection of the specific effects of the first AIDS-related illness. Thus for example it might be the combined effects of an AIDS-related illness and a crop pest outbreak that might lead to negative outcomes with respect to household food security.

It matters who has the AIDS-related illness. Thus it is important to differentiate the analysis of cause effect relations in AIDS impacts according to variables of: sex of the ill person, their location (a household member resident in urban areas possibly providing remittance income or not versus a member resident in the village), their age (an elder male or female member versus a young man or woman in a nuclear family), household economic status, existing household dependency ratios and the time lapse between onset of the illness and death (see Yamano and Jayne 2004).

It is proposed that the household has a number of ways in which members can respond to each specific effect through adaptive practices, thus weakening the strength of the implied cause-effect relation between effect two and effect three, for example. These potentially may set the household onto a different trajectory whereby the effects of an AIDS-related illness are progressively moderated and thus lead to household recovery from the immediate effects. For conceptual purposes it might be possible to distinguish between endogenous household responses and effects – that is responses generated from within the household from those that are exogenous in that they draw on social resources outside the immediate household to assist. However given as discussed later the considerable fluidity of household identity, in practice it may not be meaningful to make this distinction.

Selectively building on this framework for causality analysis this report first explores some of the wider drivers of change, drawing attention to the context within which HIV and AIDS impacts have been elaborated. In particular long term and dynamic trends of shifting crop area, composition and yields driven by price and disease, point to difficulties of using crop measures as indicators of impact effects. In addition there has been a long term trend of the increasing importance of non-farm income, thus reducing the significance of on-farm production for food security. The report then goes on to review selected aspects of the data with respect to HIV and AIDS impacts on household demography, socio-economic status, school attendance and fostering practices. We conclude by reviewing the evidence on HIV related effects on household economies – through the effects on land cultivation and cropping patterns.
Wider Drivers of Change

Rural Income Diversification

The study areas are located in Masaka and Rakai, two districts in the South West of Uganda in what is known as the Lake Victoria Crescent Agro-ecological Zone (Wortmann and Eledu 1999). This zone is characterised by high levels of humidity and a bimodal rainfall pattern with annual rainfall decreasing from almost 1200 mm at the lake shore to 1050 mm at its western border (FAO, 2006). Temperatures are moderate (annual mean 21 °C) due to an average altitude around 1250m above sea level. The landscape is characterized by flows from wetlands to cultivated areas followed by grasslands and forests in the West (Buyinza and Mukasa, 2007).

The people living in the study areas have been mainly subsistence farmers. The land is largely fertile. Agriculture is primarily rain fed and therefore agricultural production is subject to the effects of periods of dry weather, which is a major constraint to agriculture in the area (particularly for banana and maize production). The majority of the population is ethnically Baganda, but there is a large representation of immigrants from Rwanda. There are also some in-migrants from Tanzania and other parts of Uganda. The main local language is Luganda which is spoken and understood by all the tribes. The community is predominantly Christian (mainly Roman Catholic) with the majority of the remainder Muslim. Most households have less than four acres of land. However, there are a small number of sizeable land owners and relatively few households are landless.

The two districts experienced a considerable amount of unrest in the years prior to 1986, when President Museveni took power. Masaka town was largely destroyed in the Uganda-Tanzania war in 1979 and again in 1981. Civil conflict during the 1970s and 1980s undoubtedly affected people's lives, and many people in the study areas tell stories of taking refuge in more remote villages away from troop movement and fighting. Cattle raiding at this time caused economic decline in Rakai. Hunter et al. (1993) report that cattle theft was common in areas near the Tanzania border and that cattle holdings had been reduced during the civil wars of 1978-79 and 1983-86. Given the role of rainfed agriculture in the Districts, prolonged dry spells as well as pests and diseases (as we describe below) have also been an important influence on people's farming. In 1992 a particularly dry year caused severe food shortages, a pattern that was repeated again in 2009, when the rainfall was again sparse.
The period since 1986 has seen increased livelihood diversification into non-farm income sources in both Rakai and Masaka. Although farming still plays a central role in the rural economy of Uganda, evidence has shown that for many households the non-farming component of household income is increasing (e.g. Smith et al. 2001). Smith (2001) using evidence from Rakai District has shown that there are steady and shifting livelihood patterns among rural communities underlined by an increasing reliance on non-agricultural activities for generating income. The establishment of small industries, retail shops, restaurants and bars in the late 1990s provided employment opportunities for some poor people, diverting interest away from traditional farm enterprises towards non-farm sectors. There was increasing investment in the region with, for example, the establishment of schools and health facilities which created opportunities for education and local employment. The role of education as a factor in reducing agricultural production has been presented in the literature (e.g. Reardon 1997; Smith et al. 2001; Pender et al. 2004), with evidence from Rakai showing that younger educated people with sufficient knowledge and ability and strong social networks engaged with more profitable non-farm formal sector employment, leaving the older and less-educated in traditional, non-manufacturing activities (Smith et al 2001). This trend was encouraged by the introduction of Universal Primary Education in Uganda in 1997, which led to an increase in primary school enrolment from 53% in 1990 to 94% in 1998 (ibid) in the country as a whole.
Crop Area Dynamics in Uganda

The central/south western area of Uganda has a rich cropping system with seven core crops, both perennial, semi-perennial and annual that are cultivated over two cropping seasons that run into each other. This is inherently a relatively secure cropping system in an area of reliable rainfall given the buffering effects of this diversity against specific crop failure and the fact that longer term food crops (such as banana and cassava) provide against shorter term crop failure of maize or beans, for example. It is significant that this is not a farming system where crop storage has been traditionally practiced.

The diversity also offers flexibility in how households deploy labour to manage it. Some crops are more labour intensive than others and Table 1, below, ranks the crops according to an assessment of increasing labour intensity required for management. However it is very difficult to be precise when determining actual labour requirements given the shifting proportions of crop combinations and the fact that these crops are not grown as monocrops. Crop mixtures may in themselves provide some buffering to mitigate specific labour shortages although particular crops (e.g. maize) experience significant yield reductions if they are not weeded in a timely manner.

Information in Table 1 summarises the broad trends of each crop in terms of area and production and indicates what some of the key causal factors may have been during these changes. Thus coffee, reportedly the least labour demanding of crops has over the last two decades or more experienced a significant rise and fall in production, a rise driven upwards by price increases and downwards by price decreases and the effects of disease. More recent price rises have not apparently offset the effects of coffee wilt. In contrast cassava has steadily increased in area although yields may be falling due to disease effects. It has been suggested (Fermont et al, 2008) that a primary driver of this expansion has been increasing land pressure, increasing cropping intensity and declining soil fertility leading to a deliberate expansion of cassava, seeking to mitigate the effects of this low soil fertility. Cassava may also have expanded into areas from which banana has declined, and been supported in its expansion by the experience of drier periods and the fact that it is less labour demanding than banana.4

Another crop that has seen a long term rise in area and production is maize which with a relatively short growing season fits well into both cropping seasons, potentially increasing calories output per unit area over banana, has a good market and is also said to be less labour intensive than banana. The other major food crop of the system, banana, although remaining culturally significant and still an important food source over the last two decades has been in decline both in area and yield. Whether this is because expanding maize production is pushing it out or because of disease, is unclear but banana is seen to be a more labour demanding crop than maize, not least for its pest management in recent years.

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4 Although the labour requirements then first increased (per unit cassava produced) during the outbreak of cassava mosaic virus (Piet van Asten, personal communication October 2010).
### Table 1: Long Term trends in crop area and production and potential drivers of these

<table>
<thead>
<tr>
<th>Crop ranked by increasing labour needs (less to more)</th>
<th>Prices</th>
<th>Pests</th>
<th>Changes in area/production</th>
<th>Drivers</th>
</tr>
</thead>
</table>
| Coffee                                               | 1987-1995 ↑  
  1995-2001 ↓  
  2002-2010 ↑ | Coffee Wilt | 1987-1995 ↑  
  1995-2006 ↓↓ | Price  
  Price + disease |
| Cassava                                              | 1987-2004 subsistence  
  2005-2008 ↑ | Cassava Mosaic Disease (CMD) | 1990 – 2010 area ↑  
  1990 – 2010 yield ↓ | Falling soil fertility,  
  Decline in bananas,  
  Less labour,  
  drier periods → area ↑;  
  CMD → yield ↓ |
| Maize                                                | 1987-1999 subsistence  
  2000-2010 ↑ | Maize Streak Virus | 1990 – 2010 ↑  
  1990-2010 ↓ | Less labour  
  Cash crop  
  Food shortages  
  Drier periods  
  Declining soil fertility |
| Banana                                               | 1987-1995 →  
  1996-2001, ↑↑  
  2002-2010, ↑↑ | Pests & diseases | 1970 – 1990 area ↑,  
  yield ↑  
  1990 – 2010 area ↓,  
  yield ↓ | Increased Maize,  
  Labour supply ↓  
  Pest and diseases  
  More prolonged drier episodes. |
| Beans                                                | 1987-1995, →  
  1996-2001, ↑  
  2002-2010, ↑ | Multiple pests and diseases | 1970-1990 yield →,  
  area →  
  1990-2010 ↓ | Reliable as short duration.  
  Reduction in Soil fertility |
| Sweet Potato                                          | 1987-2000 subsistence  
  2001-2010 ↑ | Multiple pests | 1990 – 2010 ↑  
  1990-2010 yields ↓ | Drier periods ↑  
  Food shortages  
  Labour supply ↓  
  Reduction in soil fertility. |
| Groundnuts                                            | 1987-1995 →  
  1995-2001 ↑  
  2002-2010 ↑ | Groundnut rosette disease | 2000-2010 area ↓  
  2000 – 2010 yield ↓ | Food shortages  
  Drier periods ↑  
  Labour supply ↓ |

Key: ↑ = increase; ↑↑ significant increase; ↑ = decline; → = no major change

Three other crops complete the crop portfolio – beans, sweet potato and groundnuts. These are all labour intensive crops, significant in household diets but grown on relatively small areas. Disease and pests have been an important factor reducing yield but broad trends in area and production are not identified. What stands to their advantage is their short cropping
period and therefore their ability to crop within a growing season, avoiding the effects of rainfall shortfalls except in the driest years.

In summary the major crops of the study areas cropping system have been undergoing long term changes in terms of their contribution (in area, production and function) to the cropping system. Labour requirements are only one of the reasons for these changes. Accordingly separating HIV effects on agriculture from broader and longer term trends in crop composition and importance is not easy.
A review of the empirical evidence from MRC/UVRI and RHSP Uganda on HIV and AIDS impacts on household composition and economy

A wealth of data has been generated as a result of this study. Our key findings, related to four broad areas drawn from the research questions, HIV impact on household demographic structure, surviving household members and broader effects on households and their economies are presented below.

We begin with a reflection on the unit of analysis, the household.

Problematising the household

The choice of the household as the unit of analysis in the two cohorts is not unproblematic, as we have discussed elsewhere (Seeley et al. 2008). A household is generally defined as `a set of individuals who share not only a living space but also some set of activities’ (such as food production and consumption and child rearing) (Yanagisako 1979: 165). However, this group of people seldom lives in isolation from wider kin and friendship groups. Those links with people outside the household unit can be very important in our understanding of the impact of HIV and AIDS, as Barnett and Blaikie (1992) reminded us. They categorized households as unaffected, afflicted and affected in which the ‘affected’ were those households where `the death of a family (not necessarily household) member who was contributing cash, labour or other support, or because the death or illness of a family member has meant that, for example, orphans have come to join the household’ (1992: 86).

The recent work of Hosegood et al. (2007), exploring the impact of illness and death in 12 households in South Africa, over a two year period, supports the point that events beyond the household unit need to be taken into account when exploring the social and economic impact of HIV and AIDS.

Not only may households have important links to social networks, definitions of households as unaffected, affected and afflicted, or as we term them in this study `infected’ or ‘uninfected’ change over time particularly when the time period of study is more than a decade.5 In our study we found that in practice many of the households thought on the basis of the annual survey data to be ‘HIV-infected’ were not because households had re-formed, and been renumbered and had `lost’ the association with the previous HIV-positive classification, even though a member may at one time have lived in that so-called HIV-infected household This points to the challenge of trying to label households as infected and uninfected as well as the very dynamic nature of household and family structures in this population. Three case studies illustrate this:

1) Household number 12, located in a trading centre, was selected for our study sample. The head of household12 was a 43 year old mother of 5 children and had lived in household number 120 as a child. In GPC round 15, the head of household 12 left household 120 and established her own household. However, the household head of 12 was also the caretaker of her ageing parents in household 120, a task she was continuing to do even after she had

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5 We recognise that this terminology is not unproblematic. A household as such cannot be `infected’, a person within a household is the one who is infected (or not). However, we use the terms `infected’ and `uninfected’ to apply to households which have or have not experienced and AIDS-related death, so as not to confuse these households with ‘affected’ households as used by Barnett and Blaikie (1992). We choose not to use their term `afflicted’ instead of `infected’ because the latter term more precisely refers to HIV-infection.
left. To ensure food security for herself and for her parents' household, she had not stopped cultivating her parents' pieces of land. Her daily routine included tea and meal preparation for her parents in addition to cultivation in their piece of land. In the evening, after preparing supper for her parents, she also went and prepared her supper at her own home. Although lunch was shared between members in 120 and 12 households supper was eaten separately in each house. During day time household 12 and 120 appeared to be one household because they shared day-time meals and the land which provided their food while during night time these were different households because they neither shared meals nor residence. These two households also shared members. This was because before the five children of the head of household 12 were divided between the two households. Three of her children took turns to share supper and residence with her. The rest of the time they stayed with their grandparents.

2) Household 122 and was headed by a 36 year old single mother. We found that the entire membership of household 122 household had migrated outside the study area in 2006 except for one member. The reason for the entire household's out migration was because the household head had got married to a man who lived outside the study area. She went with all the household members except one. The member who had remained was aged about nine years and he joined household 152 then, in 2008 moved to household 150. This boy formerly a resident in 122 is a grandson to the household head of 150. Meanwhile, the house and the land formerly occupied by household 122 were occupied by another household in 2009. The head of the household said that they were only workers residing at their place of work while taking care of their boss' land.

3) The head of household 154 had died and the other household members had moved outside the study area. However, we found that there was one person who was residing in the targeted household’s house. He was not using the land at all. One of the grandchildren of the household of 154, staying elsewhere in the neighbourhood was using this piece of land for grazing and cultivation.

These brief examples point to the very dynamic nature of household and family structures in this population.

**HIV effects on household demographic structure**

When data collection began in both cohorts in the early 1990s, the HIV epidemic was at its peak. Prevalence in Masaka was roughly 9% in 1990 and roughly 17% in Rakai in 1995. Between 1990 and 2000 HIV prevalence was declining for both males and females in both cohorts. While there has been an increase in prevalence from 2004 onwards which has undoubtedly been influenced by the introduction of anti-retroviral therapy, however there are signs of a small increase in incidence, particularly among women, in recent years, although the overall trend is downward, as shown in the figure below.
In the GPC more than half the population has been below 15 years and the proportion of the so-called productive age group (15-49 years) has remained stable at about two fifths of the population throughout the study period. However there is some evidence that the proportion of the population below 15 years has reduced slightly from 53% at baseline to 52% in 2007/08. The two population pyramids from the GPC data shown below indicate clearly that Gillespie’s (1989) concern about the effects of the epidemic on child mortality, and the overall population profile, has not come to pass in this population. It may be that very real fears about the loss of children because of HIV, prompted people to have more children. The slight dip in the 0-4 years age group in the 2006/07 pyramid, might suggest growing confidence that children will survive.
The age dependency ratio is defined as the ratio of young people less than 15 years of age plus persons aged 61 and older, to those in the age group 15-60 years. This statistic indicates the relative importance of those in the “dependent” ages to those in the productive
ages. This ratio also serves as a measure of demographic change. In developing countries characterised by high fertility, the ratio typically ranges from 80 to 105 dependents per 100 productive persons while in developed countries the ratio is between 50 and 60 per 100 productive persons when the productive age is defined as 15-64 years. In the GPC comparing the dependency ratio at baseline to 2008, it is apparent that the dependency ratio has decreased (or improved) from 142 at baseline to 135. When looking at the age bracket 15-64 years as the productive age, the dependency ratio was 133 at baseline and 128 in 2008. Even by developing country standards, the current dependency ratio of 135 (or 128 with “productive” defined as 15-64 years) is still very high. It is expected that the dependency ratio will show further reductions in the years to come as fertility declines to lower levels. Coupled with Anti-Retroviral Therapy which will reduce mortality levels among those in the adult ages, the dependency ratio can only continue to drop.

However in the GPC data there were differences in household structures between HIV-infected and HIV-uninfected households. In 1990/91 HIV-uninfected households had a higher dependency ratio, 142 compared to 115 in HIV-infected households. The dependency ratio in HIV-infected households however rose and was consistently above the dependency ratio in HIV-uninfected households from 1996/97 to 2003/04. In 1996/97 the dependency ratio in HIV-infected households was 142 and remained the same on average until 2003/04. In the same period the dependency ratio of HIV-uninfected households stabilised at about 137. In 2004/05 the dependency ratio in HIV-infected households dropped below that of HIV-uninfected household and continued to drop through to 2008.

The RCCS data show that in Rakai the dependency ratio in HIV-infected decreased from 150 in 1995/96 to 109 in 2006/08 and from 108 to 100 in HIV-uninfected households. However, the dependency ratio in HIV-infected households remained higher than in HIV-uninfected households at all study rounds. Any increase or decrease in HIV-infected households was also reflected in the HIV-uninfected households at each study visit. The fact that the dependency ratio for total and uninfected households is almost the same (as shown in the figure below), that is, that the contribution of the HIV-infected households to the total is relatively small, is because there were not that many HIV-infected households. Therefore we may assume that the precision of the dependency ratio for infected households is low. A similar pattern exists for the GPC data. This finding is, we believe, a result of our definition of HIV-infected household. It may seem counter-intuitive given the levels of HIV prevalence that there would be such a predominance of uninfected households. However, our definition excludes households where someone was infected, but no death had occurred. However, when considering the higher dependency ratios in ‘infected households’ we might also suggest that some benefits that became available over the study period to households where there were ‘AIDS-orphans’, provided by churches and non-governmental organisations, for example, may have had an impact on the dependency ratio of such households. So again the evidence does not support unequivocal effects of HIV and AIDS on household dependency ratios given issues of method, household definitions and evidence on outcomes.

6 Given our other research which shows that many people aged 50-64 are extremely active and productive members of their households, we would suggest 15-64 is a more realistic age range for ‘productive’ age group and, in the case of men ‘reproductive’ too (Seeley et al. 2009).

7 We did not want to consider all households where someone was living with HIV as ‘infected’ because many people living with HIV remain healthy for some time. HIV is most likely to have an impact on the dependency ratio, for example, when someone becomes ill and dies.
In both cohorts the number of HIV-infected households increased from the second round of data collection, suggesting that HIV-infected people may have moved into the cohorts to access care. However, this stabilised over time, although the impact of ART can be seen in recent years with the numbers of HIV-infected households once more increasing.

We looked at the proportion of female headed households and found that it has increased over time in both cohorts. Other research (see Urassa et al. 2001) has found that female-headed households increase over time as a result of AIDS-related deaths, or at least this was so in the early years of the epidemic, perhaps because more men than women had been infected and died at that time, although clearly our prevalence data call this into question. The number of male-headed households has not changed greatly over time so it may simply mean that more women have been choosing not to remarry after divorce or the death of their husband or to co-habit with a man at all.

**Figure 6: RCCS (RHSP) Dependency Ratio by Household HIV Status**

**Figure 7: GPC Proportion of Female Headed Households**
We also examined the proportion of widows who moved per round over the study period in HIV-uninfected households compared to HIV-infected households. However because the numbers of widows in HIV-infected households who moved household was very small (never more than 12 cases and usually in the 0 to 5 cases in any year for both cohorts) it was difficult to meaningfully interpret those data.

Social and Economic Effects on surviving household members, and household viability over time

The effects of the HIV epidemic on the surviving household members is examined through the broader GPC/RCCS data as well as the new data collected for this study from the GPC. With respect to household size the evidence does not point to major changes or differences between HIV-infected and uninfected households. In the GPC in 1991 to1995 HIV-infected and uninfected household size averaged five and four persons respectively. In the period 1996-2000 the average household size of HIV–infected households reduced to 4.4 while it increased to 4.3 for HIV–uninfected households. Over time average household size has remained higher in HIV–infected households than in HIV-uninfected households. Although there is an overall decline in household size this decline is more marked in HIV-infected households. The average household size by 2007 being 4.4 persons compared to 4.7 in the period 1991 to 1995 in HIV-infected households. Comparatively, the average household size in HIV-uninfected households remained stable at 4.3 persons since 2007 while average household size stabilized at about 4.5 for HIV-infected households since 2006. (See Figure 8 below).

**Figure 8: GPC Overall Average Household Size and Average Household Size by Household HIV Status**
These data show that over time there has been a narrowing of the difference in household size between HIV-infected and HIV-uninfected households.

What might have happened within the household? We now reflect on three issues: school drop-outs, fostering of children and household socio-economic status. Statistics on school drop-outs (particularly prior to the introduction of Universal Primary Education\(^8\)) have something to tell us about availability of household resources.\(^9\) Data on changes in fostering patterns may suggest an impact on household size and dependency ratios as a result of HIV-infection (Urassa et al. 1997 and Foster 2000 among other studies).

**School drop-outs**

For the GPC the proportion of people in the age bracket 14 to 20 years who dropped out of school declined from 25% in 1995/96 to 10% in 2007/08 as more children completed primary school. This is likely to be due to the introduction of Universal Primary Education in 1997. However there has been no marked difference in the proportion of children who drop out of primary between HIV-uninfected and HIV-infected households and the number is on the decline for both categories of households.

**Figure 9: GPC Proportion of Primary School Drop-outs Over Time by Household HIV Status**

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\(^8\) Although analysis of the data on schooling in Uganda is now suggesting that increased access to education in Uganda has also seen an increased in student drop-outs. Analysis of the data on schooling since the introduction of Universal Primary Education, published in 2006, shows that there was an initial demand for primary school, with a net enrolment rate of 70%, but this decreased with student maturity as primary schools retained 49% of students to Primary-five (http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=121&IF_Language=eng&BR_Country=8000 accessed 4th July 2010. See also Grogan 2006).

\(^9\) A number of different studies (Gachuhi 1999, Ainsworth et al. 2000 and Bennell 2005, for example) have found an association between AIDS-related sickness and death and school attendance by children either because of a lack of school fees, or because they are needed for household tasks.
It is interesting that the data presented in Figure 9 show that the number of drop-outs was already declining before the introduction of Universal Primary Education, this may have been because of increased interest in education as an investment for the future.

Those that had ever joined secondary school were analyzed from the GPC data to estimate the proportion that dropped out at ordinary level (O’ level) of secondary school. The analysis was restricted to people aged 20-35 years because they have a limited chance of rejoining school if they dropped out, but were not too old to have dropped out prior to 1989, before the GPC was started.

The results show that between 1995/96 and 2001/02 the proportion of secondary school drop-outs was higher in HIV-uninfected households and was on a decline. That is, in 1995/96 the proportion of secondary drop-outs was 49.6% in HIV-uninfected households against 39.1% in HIV-infected households. In 2001/02 the proportion of secondary school drop-outs was 47.2% against 40.0% for HIV-uninfected and HIV-infected household, respectively. However from 2002/03 onwards the proportion has been higher and on the rise (Trend test p=0.02) in HIV-infected households. In 2007/08 the proportion of drop-outs was 47.7% in HIV-infected households versus 45.1% in HIV-uninfected households. There is just a border line increasing trend (Trend test p=0.059), however, in HIV-uninfected households as shown in Figure 10. If this trend continues it could attain statistical significance.

Figure 10: GPC Proportion of Secondary School (O level) Drop-outs Over Time by Household HIV Status

For Rakai looking at the data from the RCCS for all age groups, the majority of the population in both HIV-infected and uninfected households, who went to school, reported having completed primary school at all the study rounds. For those aged 15 to 29 the percentage of the population with ‘no education’ has fallen over time, this is presumably because of the impact of the introduction of Universal Primary Education.
Child fostering
In the GPC, over time, more children have been fostered in HIV-infected households than in HIV–uninfected households in absolute terms. In HIV–infected households the average number of children fostered has been fairly stable at about 2.4 children per household over time although it is beginning to decline. For HIV-uninfected households the average number of children fostered fell from 3.4 in 1991 to 1995 to 2.3 in 2001, and has since 2002 stabilized at about 2.4 children per household (see Figure 11 below). This finding suggests that contrary to the findings of other studies, cited above, children are not necessarily fostered out of HIV-infected households.

Figure 11: GPC Average Number of Children Fostered by Household HIV Status

Fostering of children is widely practiced in many parts of Africa, and the study area is no exception. Biological parents may send children to live with other people, often family members, for long periods of time for many different reasons: to strengthen family ties, redistribute child labour, adjust household size because of shortages/surpluses, and schooling (Serra, 2009), all of which may be independent of HIV-infection.

Socio Economic Status
In the GPC every four years (except between 2000/01 [round 12] and 2005/06 [round 17] where the interval was 5 years\(^\text{10}\)), starting at baseline, information is collected on socio-economic status using a list of household assets. At each of the time points a socio-economic status score was calculated as a weighted sum of the assets in a particular household. The weights were computed by carrying out a separate Principal Components Analysis for each time point on the set of 0/1 indicator variables denoting absence or presence of each item. The Principal Components Analysis chooses the weights in order to maximize the variability of SES between households; in practice this leads to smaller

\(^{10}\) This was simply due to an error, when this part of the census was not included in Round 16.
weights being allocated to relatively common items (such as a pot for keeping water) and larger weights being allocated to relatively rare items (such as a motor car).

The proportion of low socio-economic status households has consistently been lower than the proportion of high socio-economic status households in the population. The proportion of high socio-economic status households has been steadily declining (Trend test $p=0.003$) over the period from 33.2% at baseline to 23.8% in 2005/06. The proportion of the low socio-economic status group has not exhibited any significant trend over the years (Trend test $p=0.59$).

To examine the impact of HIV on the socio-economic status of households, the proportion of low and high socio-economic status households was analyzed for HIV-uninfected and HIV-infected households separately. We found that the proportion of low socio-economic status households within HIV-infected households was lower than the same proportion among HIV-uninfected households in all the periods. From baseline to 2000/01 the proportion of low socio-economic status among HIV-uninfected households has been steadily reducing from 37.6% to 21.7% (Trend test $p=0.029$). Although there has been a reduction in the proportion of low socio-economic status among HIV-infected households this did not show a statistically significant trend (Trend test $p=0.169$) over the same period. The proportion rose sharply in both categories of households in 2005/06 as shown in Figure 12.

**Figure 12: GPC Proportion of Low Socio Economic Status Households by HIV Status**

The proportion of high socio-economic status households was higher among HIV-infected households from baseline to 1996/97. In 2000/01 and 2005/05 the proportion was higher among HIV-uninfected households. From 1993/94 onwards the trend has been for the proportion of high socio-economic status household to decrease in both HIV-uninfected (Trend test $p=0.035$) and HIV-infected households (Trend test $p=0.002$) as shown in Figure 13.
These results show that in this rural setting relatively wealthier households were more likely to experience HIV infection at the beginning of the epidemic. This is why the proportion of households classified as being of low socio-economic status was lower among HIV-infected households from 1990 to 2006 while at the same time the proportion of households classified as being of high socio-economic status was higher among HIV-infected households from 1990 to 1997. This may be explained in many ways but it is plausible to think that wealthier households were more likely to have members who lived and worked in urban areas where HIV incidence rates were higher than inland rural areas, such as the study area, at the beginning of the epidemic. Such people through their remittances raised the socio-economic status of the households and once infected and became ill returned to the village where they eventually died. It might also be argued that better off households were also more likely to have had members who lived in the village but were engaged in business and trading activities that took them away from their homes, thereby exposing them to HIV infection. However, we would also suggest that it is also likely that wealthier households took care of sick relatives because they had the resources to do so, so the HIV-status of the household may have been influenced by the presence of an HIV-positive relative who had come to stay with them for care.

Our findings on school drop-outs, fostering and socio-economic status show a mixed picture. The patterns of school drop-outs and fostering show no direct link to HIV-infection. The findings on socio-economic status do appear to show some impact from HIV-infection but, as we suggest above, it is difficult to know quite why this is so without knowing more about the details of the position of the person in the household who was infected, and also the support different households may have received from outside, which may have mitigated the impact of AIDS-related illness and death in the short-term.

**HIV effects on household economies**

We draw on the new primary data from the GPC to explore our findings on this topic.
As noted above, the impact of prolonged morbidity and eventual mortality on households and agricultural productivity because of HIV and AIDS has been thought to have severe ramifications for agriculture by reducing agricultural production. If there is diversion and loss of labour (as suggested by Gillespie 1989), one would expect to see a serious impact on agricultural production, particularly if the crop is labour intensive.

In the current study we examined the impact of HIV and AIDS on crop production by analyzing the overall trend taken by acreage cultivated for all households and then making a comparison between HIV-infected and HIV-uninfected households. In Figure 14, below, it is evident that the average land under cultivation was higher in HIV-infected households at baseline, possibly because of their higher socio-economic status (as noted above). At baseline the average area under cultivation in HIV-infected households was 3.5 acres compared to 3.0 for HIV-uninfected households. However the average area under cultivation for infected households decreased over time and in 2008 it was the same as the average acreage under cultivation in HIV-uninfected households at 3.0 acres per household.

In summary the data do not support significant area of cultivation effects from HIV.
Crops and cropping pattern changes

The impact of HIV and AIDS on agriculture potentially may also be seen through changes in the cropping pattern of households over time if households were to respond to a loss of labour by moving from more labour intensive and long duration crops to adopting or expanding the production of crops that are less labour intensive and of relatively short gestation period.

Coffee together with beans, matooke and maize were the major crops grown by the households at baseline. Coffee being entirely a cash crop while the others being mainly food crops for home consumption. There is however evidence that over time the importance of coffee as the major crop has reduced while beans and maize have grown in importance as major crops (as discussed above p. 23). The proportion of households that grow coffee as the major crop has reduced by almost 1/3 between 1990 and 2008. However the proportion of households that grew maize as what they defined as their major crop increased by more than half over the same period while the proportion that grew beans as their major crop had a slight increase from 30% to 32%. The proportion of households that grew matooke (banana) as the major crop remained largely unchanged but there is evidence to suggest that the percentage of households in which the crop was the second major crop has reduced. Even for households that did not change their major crop to beans or maize, they said they had increased their production of beans and maize.

In order to look at the potential impact of HIV and AIDS on the cropping pattern of the households, the proportion of households growing three crops namely coffee, beans and maize over time was analyzed separately for HIV-uninfected and HIV-infected households and compared. In summary, the findings show that HIV-uninfected households were slightly more likely to grow beans than HIV-infected households while the reverse was true for maize. After the initial 5-10 years of the cohort when HIV-infected households were more likely to grow coffee, there has been little difference in coffee-cultivation between the two categories of household since 2000.
Household members were asked, when a change had occurred, why this was so. The most common reason given for a change in the major crop was food security which was reported mainly by households that changed from coffee to maize or beans. The other reasons given, especially for changing to beans, was because the growing of beans is less labour intensive, and beans are less vulnerable to drought because they grow quickly and can fetch a high market price. The reasons for changing from matooke as the second major crop (for the few households that changed from that crop) were mainly because of pest and disease vulnerability, and a low market price in the years prior to data collection. Ironically at the time of the study there was a scarcity of matooke (because of a prolonged dry spell) and the price that the few households producing this crop were able to get in the market, if they chose to sell, was high.

While our findings suggest some link before HIV-infection and crop grown, in the case of maize and beans, which may be related to labour constraints, the picture is not clear. Loss of labour could be as much due to household members migrating to urban areas or to the shores of Lake Victoria for work, as to illness and death due to HIV. Pests, diseases and prolonged dry spells affected all households and, as we have noted above, make attribution difficult.
Conclusions and Policy Implications

Before exploring the policy implications of the findings we summarise briefly the answers that can be given to the research questions established at the outset of this study. The research set out to analyse the trajectories of households affected by HIV and AIDS, and more specifically, the impact of the epidemic on agriculture and rural livelihoods over the past 20 years in Masaka and Rakai. Note should be made both of the fact that the conclusions drawn from the data are specific to the location of study and should not be generalised beyond this context without careful consideration. Second, and since this is part of an ongoing study, there are areas of data analysis, and data collection (for the qualitative component) that have yet to be completed, and the qualitative data on individual household trajectories will reveal much more on the mechanisms and processes of change in individual households. This will help us to explore in more detail the causalities of HIV and AIDS impact, since the analysis presented here is essentially an assessment of outcomes and not cause-effect relations.

With respect to the first question on the impact of the AIDS epidemic on household demographic structure, an important observation to make at the outset pertains to the limitations of the very category of an ‘HIV household’ and the implications of this for research design. It is not as absolute a measure. Second the data from the GPC and RCCS cohorts do not support a picture of major effects of HIV on household demographic structure, household size or on household dependency ratios. Further if one takes school drop-outs as an indicator of potential effects on household human capital, the evidence is clear that overall there has been a sharp decline in school drop-outs for both HIV-infected and uninfected households.

Linked to this, considering the data on child fostering and changes in household socio economic status, there is no clear evidence of direct HIV impacts. Thus in answer to the first research question (and also the third on socio-economic outcomes for surviving household members) HIV impacts that have been assumed or predicted are not detectable from this data set. In addition it should be noted that there is evidence of HIV being more likely to affect richer than poorer households, a factor likely to mitigate any consequences for household and community viability (the fourth research question).

We do not wish to suggest that HIV at the individual household and family level has not had a serious effect. Indeed HIV has undoubtedly had a devastating impact on many households and families and we do not intend to belittle the losses that have occurred. But the effects of scale that have been predicted for HIV on household structures are not supported by the data from these two sites in this particular context.

If the impact on household structures has not been that which had been anticipated in some of the literature (with respect to household labour in particular), what have been the effects on household farming practices, land productivity and household food security (the second research question)? Drawing on new data on crop cultivation in the GPC study area, specifically collected for this study, the evidence suggests that impacts on the agricultural component of livelihoods overall and food security outcomes have not been great. Changes in taste and agricultural practice were already in train when the epidemic began. While crop disease effects on crop yields might have been exacerbated by a shortage of labour to
manage the outbreak, that shortage of labour has also been caused by the labour migration of young people, not only because of HIV. The introduction of disease resistant varieties has helped to mitigate the impact of banana and coffee wilt, but it would seem that while matooke may still be a preferred food, many people now prefer to grow maize as a staple. This may be as much to do with changes in taste and the diversion of labour to off-farm activities, as the impact of the epidemic.

In summary the evidence does not show a direct linear connection between HIV and AIDS and outcomes across all the factors we have explored. Accordingly HIV impacts have not been as direct, or as catastrophic, at the community level as had been anticipated. What this indicates is that the wider context is important, with HIV being one factor among many that has shaped household livelihood trajectories. Households, and more particularly the wider social networks which link different households, may be much more resilient on the whole than had been expected.

What does this suggest for policy? Firstly, the HIV-epidemic has not happened in isolation; other factors such as climate, pests and diseases, growing land pressures, broader changes in the economy and increasing availability of public goods, notably education, have and continue to have an impact on and drive change in rural livelihoods. Policy interventions outside agriculture and health have had an impact on households. The increased availability of primary education, because of Universal Primary Education, has most obviously affected school enrolment and drop-outs but also affected labour availability in some households. The perceived impacts of the HIV-epidemic cannot therefore be addressed in isolation from these other drivers.

Secondly, and linked to this, it is important that HIV-related interventions are not based on deterministic models of path dependency, simply assuming that once a household has a member who is HIV-positive a certain outcome is, or prior to anti-retroviral therapy was, almost inevitable. This is clearly not the case. Rather the evidence points to more evolutionary patterns of path dependency and a capacity of households, and their social networks, to respond both to the negative effects of HIV incidence as well as other both negative and positive drivers of change in their immediate environment.
References


