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The Effects of HIV/Aids on Agricultural Production and Poverty in Kenya

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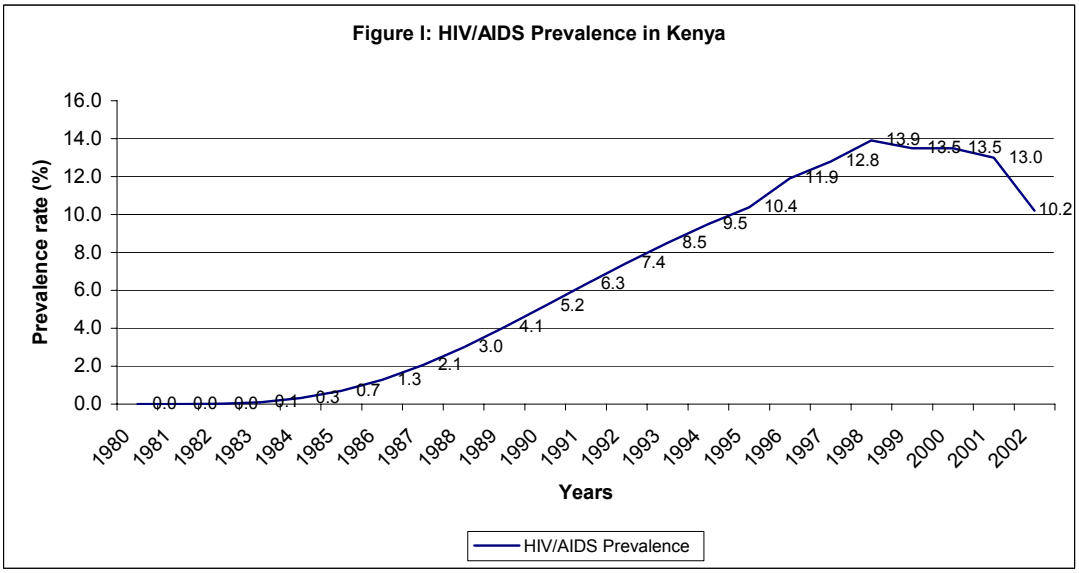
Abstract: Although HIV/AIDS prevalence in Kenya has shown a downward trend in the recent years, it continues to impact negatively on agricultural production and food security in rural areas. The declining trends in crop production remain a challenge for development efforts. This study examines the extent to which AIDS has impacted on agricultural production, incomes and food security. Using a sample of 212 households, the study examines changes in welfare of households experiencing death and illness associated with HIV/AIDS condition. Poverty incidence and severity are observed to be higher among affected and non-affected households. The higher poverty levels among the 'affected' cohort can partly be explained by lower crop and livestock production. In the absence of formal insurance mechanisms, medical costs take precedence over crop and livestock intensification; any credit that may be available goes to cater for medicare; the few assets available are disposed for purposes of meeting health needs. There is less land under crops and more fallow among the affected households. The effects are worse for farm households in the marginal areas an indication that there may be need for special programmes for arid and semiarid areas. Given that poverty seems to reinforce the spread of the HIV/AIDS and that once AIDS strikes it becomes a driver of poverty, the study adds further support to views that intervention strategies need to deal with poverty and HIV/AIDS problems concurrently.

1 Introduction

In about fifteen years, the AIDS situation in Kenya had progressed from a one case in 1984 to over 2.13 million HIV positive cases in the country, with more people being in rural areas. Figure I show this progression.

Figure I: HIV/AIDS Prevalence in Kenya



Source: Government of Kenya, economic Surveys, various issues.

Although the new infections seem to be on the decline, HIV/AIDS still constitutes a big threat to various sectors of the economy and especially the labour intensive ones like agriculture. With agriculture being the mainstay of the country's economy any threat to its production is a threat to the whole economy. This demands a thorough understanding of impacts and avenues through which such a threat operates. Such an understanding is critical to the success of intervention efforts for mitigating effects of AIDS. This is more so given the invisibility of the AIDS impacts on agriculture (Topouzis, 2000).

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This study is an effort to contribute to emerging knowledge on implications of coping strategies adopted by households in response to HIV/AIDS on household welfare. The study seeks to quantify the effects of HIV/AIDS on agricultural production, incomes and household food security. We use information generated from a cross-section of 212 households in Eastern Kenya surveyed between May and July 2003. The sample consists of 108 affected and 104 unaffected households. The paper is organized as follows: the next section discusses the conceptual issues, the study area, the sampling method as well as the regression model. In section three, descriptive and regression analysis results are discussed followed by conclusions and policy recommendations in section four.

2 Conceptual Framework

A conceptual issue of concern in HIV/AIDS impact studies is the unit of analysis. In this study, we focus on the household as the unit of analysis as most studies on HIV impact have done. However, some authors have noted the need to move beyond the individual household in order to factor the complex linkages and networks between households and extended families and communities (White &Robinson, 2000; Topouzis, 2000). In this study we accommodate the extended family linkages within a homestead during household identification. Labour allocation decisions including caring for the sick are likely to be shared between households of an extended family clustered in one homestead. The cluster concept allow tracing of linkages between unit households which may be affected directly and/or indirectly by HIV/AIDS (Drinkwater, 1993).

A household was considered affected if it was known to have at least one person who is HIV positive, or to have at least a person ailing from chronic illnesses associated with HIV/AIDS e.g. tuberculosis; or known to have died from HIV related death in the last three years; or was taking care of at least an orphan at the time of the survey. A household is considered unaffected if no one in the household or in the homestead is known to have experienced such illnesses or death at the time of the study or none of the households within the homestead was taking care of an orphan. However, this definition is not water tight given the systemic nature of HIV/AIDS and the high prevalence levels in some of the study area. In the absence of formal health insurance and social security systems in the country, people in the rural areas may rely heavily on social networks and relatives for financial support in times of crisis. This implies that it is difficult to find a truly unaffected household. Nevertheless, we believe the differentiation adopted in this study provides a control group from which we can get indications of impact and be able to compare.

The HIV/AIDS impacts are conceptualized as starting from the adult who first falls ill through the loss of own labour power and incomes. The effect then spreads to the immediate and extended family. The impact of the epidemic on a household focuses on points where domestic or farm labour supply may come under pressure. The potential effects of illness and death of members can be summarized as:

i. Impacts on household include reduced labour force and incomes due to morbidity and death. Loss of income may mean lower remittances from persons with HIV/AIDS, eventual loss of job, changes in household expenditure patterns due to increased medical care, and funeral expenses. Eventually, if communities are over-burdened, it may lead to breakages of traditional safety nets. This may imply families resort to disposal of household savings.
ii. Impact on children and women may include lack of access to productive assets, loss of educational opportunities for affected children and increased demands on orphans which may lead to child labour, anti-social behaviour and even increases in child-headed households.

These potential impacts of HIV/AIDS formed the basis of expectations for this study.

2.1 Sampling design

A precise sampling frame for this study required a thorough scrutiny of the population distribution patterns within the province; the distribution of agro-ecological zones and farming systems. A multistage sampling technique was applied in this study. First, stratified sampling was applied to select different farming systems in each district while bearing in mind the prevalence levels. This was done together with the assistance of the District Development Officers who are the district HIV/AIDS focal points and the counterparts in the Agricultural Extension offices. Then random sampling was done to select locations in the farming system. Within the locations, purposive sampling was done for households experiencing HIV/AIDS related illness and deaths. Given the stigma associated with HIV/AIDS and the medical ethics, we used community leaders, churches and non-governmental organizations working with people living with HIV to identify 'affected' households. The community leaders mainly used were the chiefs and their assistants. The chiefs normally issue the burial permit and often know the cause of death. More often than not, the sub-chiefs speak during the burials mainly to highlight current issues and one such topic is the HIV/AIDS awareness. For every affected household, a non-affected one was sampled from the closest unaffected homestead. Information gathered from the households included demographic characteristics, land use, crop and livestock inputs and outputs, other economic activities, health incidences and expenditure, deaths and funeral expenses. The households' data set was supplemented with information from key informants consisting of provincial administration, civic leaders, health and agricultural officers.

2.2 Study area

A case study approach was adopted. From the national statistics, Eastern province at the time of the study had the second highest prevalence of HIV/AIDS after Nyanza province (NASCOP, 2002). Four districts in the province – Mbeere, Meru Central, Tharaka and Kitui - were selected for the study. The four districts have varied characteristics in terms of agro-ecological zones and main economic activities. Crops grown range from tea, bananas and potatoes in Meru to sorghum and millet in the much drier zones of Kitui, Mbeere and Tharaka. Tharaka and Mbeere districts are semi-arid and are mainly livestock areas. HIV prevalence levels vary in the four districts. Meru surveillance centre had the highest level at 26% and was among the highest in the country in 2001. This centre covered Mbeere and Tharaka. Kitui had the least at 6%.

2.3 Regression analysis: the model

Having no *a priori* knowledge of the underlying household production function, a simple standard Cobb Douglas production function based on output accounting relationship was adopted to model the effects of HIV/AIDS on agricultural production. Labour is not disaggregated and we assume technology is a function of HIV/AIDS and other variables, which influence agricultural output such as fertilizer application, and education levels among others. The analysis assumes that households try to maximize the value of crop production given the amount of land and other resources at their disposal. An Ordinary Least Squares (OLS) econometric model is specified as follows:-

$$InQ_i = \beta_0 + \alpha_1 HIV_i + \alpha_2 Inland_i + \alpha_3 Inhhsize_i + \alpha_4 prodmtd_i + \alpha_5 seeds_i + \alpha_6 Ineducation_i + \alpha_7 Soils_i + \alpha_8 Location_i + \rho_i \quad \ldots\ldots (3)$$

Where

InQ_i – log of household crop output value

HIV - is a dummy of equal to 1 if household$_i$ is affected by HIV/AIDS epidemic through illness or death, otherwise zero

InLand - Log household land acreage per capita

Inhhsize - log of household size as a proxy of labourforce

prodmtd - a dummy of method of production is equal to 1 if household uses animal or mechanized agriculture, otherwise zero.

Seeds - a dummy is equal to 1 if a household uses certified seeds, otherwise zero;

Ineducation - Log of household head years of schooling

Soils – Soils dummies; volcanic soil, loam soil and sandy soil

Location dummies – Administrative location dummies which captures regional variations such as markets and rainfall.

ρ_i _ random error term.

A regression analysis of maize production was also done with household maize output as the dependant variables and maize prices and all other variables used in the first crop output value model being the regressors. Maize farming is practiced in all the sample districts.

3 Results

3.1 Demographic and socioeconomic profile

The total population covered in the 212 households was 1377 members i.e., family size estimated at 6.55 per household which is comparable to the areas' average of 6.5 persons per household (Welfare Monitoring Survey, 1997). Of the 1021 household members for whom we were able to get detailed data on, about a third (30%) were aged below 15 years with about 60% of this in affected households. Another 10% of the household members were aged below 16-18 years, also falling in the age bracket of children as far as the law is concerned and hence the right to inherit. This may imply a significant dependency burden. Affected households also had a higher household size than non-affected (6.7 compared to 6.4 members). The higher number under 15 years in affected households could account for the slightly higher household size (though only significant at 60%; t=0.53) for the affected households.

The findings indicate significant changes in the household structure and composition from what one would expect from a typical rural Kenyan household- both husband and wife. For instance, 43% of the sampled households had one of the spouses dead. About two thirds of the households (66%) visited were headed by female, and in about a third of these, by widows. However, these results could imply several things for the sampling process: One; could be that women are more open about the HIV situation in their homes and therefore selection can be biased towards their households. Two; it could be that men die first- a high probability during the early cycle of AIDS in a country since it is believed the men get infected first. Three; single mothers are more vulnerable to HIV and thus a likely bias in selection --about a fifth of the respondents were single.

Other important features are that close to 18% of household heads had never attended school. Another 20% had three and less years of education, and presumably not in position to read HIV/AIDS messages.

On economic activities, as expected, about half of the households (50%) were in crop farming. This represents the general picture of the country where majority of the population is known to grow some crops even when they are livestock keepers. Only 16% had livestock as major activity. Business and wage employment activities – although expected to have been major sources of household income - did not feature highly as contributors of household income. This information was heads of households' own assessment and ranking of different sources of household income.

3.2 Illness patterns

Although incidences of long-illness and death pattern within the population were the main criteria used to identify affected households, we try to assess whether the identification could have been accurate by testing for statistical differences between the affected and non-affected cohorts. We find that out of the 108 affected households; about 49% had at least one death in the household in the last 3 years compared to 29.8 for the non- affected households (Table 1). About 42% of the affected households had at least a member suffering from long unusual illness. This is higher compared to about 24% for the non- affected households. The differences of the incidences of long illness between the affected and non-affected households are statistically significant at 95% confidence level.

As some literature indicates, there is a correlation between type of occupation and HIV/AIDS infection. More of the dead in affected were engaged in business and salaried employment (36% and 26.4%) compared to the non-affected (32% and 19.4%), which may reflect higher interaction with outside world for this category.

Table 1: Illness and Deaths

	No. of observations	Affected households% (S.E)	No. of observations	Non- Affected Households (S.E)	t-value[a/*] (p- value)
Incidence of death last 3 years	108	49.07 (0.0483)	104	29.81 (0.0451)	2.911 (0.0040)
Long illness as cause of death	53	96.23 (0.264)	31	83.87 (0.0671)	2.0005 (0.0488)
Dead Occupation - Business	53	35.85 (0.0666)	31	32.26 (0.0853)	0.3303 (0.7421)
Dead occupation - Salaried employment	53	26.42 0.0611)	31	19.35 (0.0721)	0.7267 (0.4695)
Unusual long illness in the household	108	42.59 (0.0478)	104	24.04 (0.421)	2.9046 (0.0041)

Source: This survey, 2003

3.3 Possible drivers of HIV/AIDS infection

Although official statistics record lower prevalence levels for HIV, most key informants felt that the situation is more severe than earlier years-probably due to maturity of earlier infections. However, if indeed the new infections are on the decline as new data shows, an understanding of factors that could have contributed to past trends would go a long way in ensuring that the trend remains downwards. To explain the major factors responsible for rise in HIV/AIDS incidence, we mainly use information gathered from key informants and provide evidence wherever possible from the household data.

Poverty and urbanization were singled out as major contributors to the rise in HIV/AIDS. Compared to settlements in rural areas, urban and commercial farms settlements are associated with increased vulnerability due to possible changes in extended family patterns and erosion of social support networks and constraints in people's behaviour. Higher rates were found in the relatively new settlements in the peri-urban area along the Meru-Moyale road and around commercial farms of Timau. The association between vulnerability to HIV/AIDS, migrant labour practices and associated decline in social cohesion has been previously noted (Fournier & Garmichael, 1998; and Gillies & Wolstenholme, 1996). Key informant tended to associate declining social constraints with an increase in moral decadency. They felt that poverty was a major factor in this and pushed individuals to occasional sex.

Related to the above, was the issue of drought and hunger induced labour migration. Key informants in Kitui district related HIV occurrence in some homes to incidence of drought. They noted that during periods of hunger, men out of shame of not being able to feed their families abandon their homes only to return several months later after the rains. When they return, they may be infected. Evidence of return migrant workers being a cause for increased prevalence

levels was found for Thailand after the financial crisis of 1997 (Wassana & Suwannarat, 2002). Results from this survey showed many of the affected households had members being involved at some point in off-firm activities even though the main activity still remained farming.

Some studies have provided evidence that poverty can indeed drive incidence of HIV/AIDS up. (Whiteside (2002; Booysen, 2002). Whiteside (2002) describes how labour migration induced by rural poverty can contribute to the spread of HIV/AIDS and how mothers may be forced to become occasional sex workers in order to survive. However, once a household is affected, vulnerability to poverty may increase such that a vicious cycle of welfare losses is initiated. We examine the extent to which HIV/AIDS may have caused poverty to increase.

3.3. 1 Impact of HIV/AIDS on Poverty

In this sub-section, an examination is made on differences in per capita income between the two types of households (Table II). Incomes are higher for non-affected households. In addition to this general level of welfare comparison, we also determine how poverty differs between affected and non-affected households. Our hypothesis is that since HIV/AIDS affects ability of the people to earn income, and poverty is a prime driver of HIV/AIDS, we would expect to find more poverty in the affected cohort. Three measures of poverty are compared: headcount ratio, the poverty gap and poverty severity. The head count provides a ratio of the number of poor individuals to the total population. The poverty gap is a measure of depth or intensity of poverty and shows the shortfall of the average income relative to the poverty line. Poverty severity measures the severity of poverty among the poor. It is a square of the poverty gap and thus increases more than proportionally with the poverty gap. It attaches more weight to those gains furthest from the poverty line thus allowing for the extent of inequality amongst the poor.

To perform the computations, the poverty line of KShs 1238.90 provided by the Kenya Central Bureau of Statistics for rural areas is used. About 77% of the affected households are below the poverty line compared to 67% of the non-affected (Table 3). The difference is significant at 88%. These levels are higher than projected level of 65.90% for the province. The poverty gap measure is also higher for the affected households. The poor among the affected will have to increase their incomes by about 51% to reach the poverty line. The non-affected will need to increase by 39%. The results are significant. Poverty severity is also significantly worse for affected than non-affected (41% compared to 28%) an indication that AIDS is worsening inequalities among the poor. The poverty measures are worse for female than male headed households.

Table 2: Average monthly income by source and type of households

	Affected households	Non-affected households	All	*t-value*[a/*] *(p- value)*
Livestock products sales	2,688 (1,400)	5,774 (2,812)	4,202 (1,533)	0.994 (0.322)
Crop income	1,403 (162)	1,931 (176)	1,662 (120)	2.209 (0.08)
Off-farm activities income	1,998 (669)	1,446 (327)	1,727 (376)	0.733 (0.465)
Wage income	1,927 (452)	3,840 (955)	2,866 (525)	1.833 (0.069)
Total household income	8,016 (1,669)	12,991 (3,055)	10,457 (1,728)	1.444 (0.1504)
Per capita income	1,424 (277)	2,426 (606)	1,916 (330)	1.521 (0.130)

Source: This survey, 2003

Table 3: Head count poverty, poverty gap and poverty severity affected and non-affected households

	Affected households (%) N = 108 (S.E)	*Non-affected households (%) N = 104 (S.E)*	**All**	*t-value* ***(p- value)***	*Female headed N=133*	*Male headed N=79*	*t-stat (P-value)t*
Head count	76.9 (0.04)	67.3 (0.05)	72.2 (0.03)	1.55 (0.12)	75.9 (0.04)	65.8 (0.05)	1.59 (0.11)
Poverty gap	50.9 (0.04)	39.1 (0.04)	45.1 (0.03)	2.30 (0.02)	49 (0.03)	38.4 (0.04)	2.00 (0.05)
Poverty severity	40.6 (0.04)	28.17 (0.03)	43.5 (0.02)	2.59 (0.01)	38.3 (0.04)	28.1 (0.04)	2.04 (0.04)

Source: This survey, 2003

Having observed that poverty levels and severity are higher in the affected than non-affected households we examine the avenues by which AIDS produces this impacts. The primary cause for AIDS impacts is the household demographic structure. From our conceptual understanding, this may be followed by loss of labour, first due to morbidity and then

mortality. Increased illnesses have consequences for household expenditure as medical costs rise. In order to cope with the effects of this labour loss and rising medical expenditure, significant labour re-allocations within the households may occur and this may lead to changes in land use; crop and livestock mix, changes in the holding of household assets as well as investment e.g. education. We turn to these possible effects.

3.4 Effects on crop production

In subsistence agriculture, labour is probably the single most important determinant of crop output. Any illness or death may therefore have adverse effects on agricultural productivity. The survey results showed possible loss in labour time as a result of incidence of illnesses associated with HIV/AIDS. About three quarters of affected households were observed to have changed the number of working hours in the last three years. Of this, 74% reduced the working time (Table 4). This is compared with only 58% for non-affected households of whom 68% reduced the working hours. More members of the affected households recorded having left their normal daily routine to take care of the sick (75% compared to 58%). A possible consequence for these labour effects is an observed increase in uncultivated land (Fig. II).

The figure shows a 63% increase in fallow land between 2001 and 2003 for affected households. Area under fallow for the non-affected increased by 37%. The increase in fallow land may have lead to the observed decline in area under the food crop. For the affected household, area under food crop dropped from 2.3 acres per household to about 2.15 acres for the period 2001 to 2003 (6.5%) while that of the non-affected area declined from 2.52 to 2.41 acres over the same period (4.3%). However, most of the means differences across types of households are not statistically significant but they may be indicative of the trend.

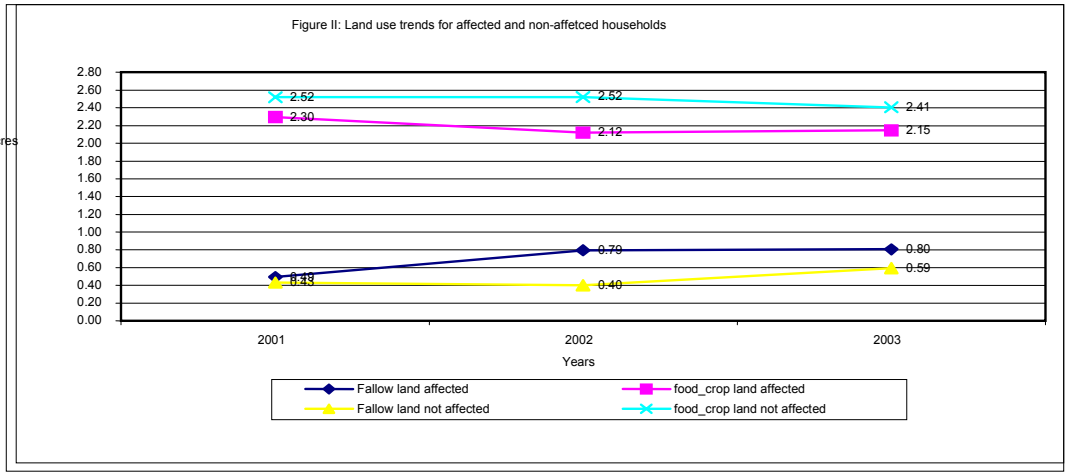

Table 4: Changes in working ours on the farm in the last 3 years

	No. of cases	*Affected % (S.E)*	*No. of cases*	*Non_affected % (S.E)*	*All% (S.E)*	*t-value[a/*] (p- value)*
Change in working hours	108	75.00 (0.04)	104	57.69 (0.05)	0.67(0.03)	2.70 (0.01)
Decline of working hours	81	74.07 (0.0490)	60	68.33 (0.0606)	71. 63 (0.0381)	0.74 (0.04582)
Leave normal daily routine to take care of the sick	60	75.00 (0.06)	43	58.14 (0.08)		.8199 (0.07)

Source: This survey, 2003

Apart from the decline in amount of cultivated land, there is less intensification in input usage in the affected households as labour time, fertilizers and pesticides levels are lower per unit of cultivated land. On average, the affected used 7.4 man-days for land preparation compared to 10.6 man-days in non-affected households (Table 5). For weeding, the non-affected households use on average 12 people in both seasons – one person more, compared to affected households. Fertilizer and pesticides show similar trends to labour use. About 34.3% and 87% of the affected households used fertilizer and pesticides respectively, compared to 41.4% and 91.4% of the non-affected households.

Table 5: Input usage for affected and non-affected households

	Affected % (S.E) N=108	*Non Affected % (S.E) N=104*	*All% (S.E)*	*t-value (p- value)*
Land preparation man days – main season	7.55 (0.72)	10.59 (1.17)	9.04 (0.69)	2.23 (0.03)
Land preparation man days – short season	6.89 (0.81)	9.43 (1.17)	8.14 (0.72)	1.76
Land preparation man days per season	7.22 (0.69)	10.01 (1.02)	8.59 (0.62)	2.28 (0.02)
Number of people involved in weeding – main season	11 (1.49)	13 (1.863)	12 (1.185)	0.68 (0.50)
Number of people involved in weeding – short season	10 (1.65)	11 (1.399)	11 (1.081)	0.21 (0.83)
Number of people involved in weeding per season	11 (1.49)	12 (1.513)	11 (1.0580)	0.49 (0.63)
Costs of land preparation per season (Kshs)	502.49 (79)	626.85 (106)	563.50 (66)	0.95 (0.34)
Costs of weeding per season (Kshs)	738.19 (133)	872.46 (176)	804.06 (110)	0.61 (0.54)
Fertilizer application	34.26 (0.05)	41.35 (0.05)	37.74 (0.03)	0.774 (0.46)
Pest control application	87.04 (0.03)	91.35 (0.03)	89.15 (0.02)	1.00 (0.32)

Source: This survey, 2003

The effect for the reduced intensification is reduced crop incomes for the affected households. Computed annual crop income for the non-affected households was Kshs 23,166 while the affected households had Kshs. 16,832. These findings are consistent with those of Yamano & Jayne (2002), who investigated the effects of prime adult death in rural Kenya. Per capita crop income are also lower, being only 68% that for the non-affected (Kshs 3,133 versus Kshs 4,582) (Table 6).

Another possible effect of lower working hours is changes in cropping patterns. Studies elsewhere have shown that due to labour shortages, AIDS affected households may adopt less labour intensive crops (Barnett et al**,** 1995). Although we did not get detailed information on all types of crops grown, more households in the affected cohort (36%) indicated that they no longer grew some crops they used to grow three years ago compared to 22% of the non-affected households (Table 7). Yamano and Jaynes *ibid* who examined a broad range of crops had similar findings.

Table 6: Household farm size, household size, annual crop income and per capita crop income by household type

Variable	Affected Households (S.E.)	Non-Affected Households (S.E.)	All	t- statistics (*P* – value)
Farm size (acres)	2.48 (0.18)	2.69 (0.17)	2.58 (0.12)	0.88 (0.38)
Average Land size per household member (acres)	0.41(0.03)	0.50 (0.04)	0.46 (0.026)	1.80 (0.07)
Household size	6.66(0.28)	6.45 (0.27)	6.56 (0.19)	0.53 (0.60)
Annual crop income (Kshs.)	16,832 (1939)	23,166 (2117)	1,9931 (1446)	2.2093 (0.03)
Annual per capita crop income (Kshs.)	3,133 (422)	4,582 (532)	3,844 (341)	2.1402 (0.03)

Source: This survey, 2003

Table 7: Change of cropping patterns for affected and non-affected households

	Affected % (S.E) N= 108	*Non-affected % (S.E) N= 104*	*All % (S.E) N= 212*	*t-value[a/*] (p- value)*

Changed cropping patterns	36.1 (0.05)	22.1 (0.04)	29.3 (0.03)	2.3 (0.03)
No Change	50.9 (0.48)	69.2 (0.46)	59.9 (0.34)	2.8 (0.01)
No Response	13	8.65	10.9	
Total	100	100	100	

Source: This survey, 2003

3.5 Effects on Livestock Production

Just as in crop production, affected households were found to be less intensive in livestock production (Table 8). Consequently, income earnings from livestock products are less than half (about 47%) of those earned by non-affected (Table 9). This is despite having a relatively higher number of cattle and goats (Table 10).

Table 8: Costs of livestock production inputs

	Affected (#) (S.E)	Non-affected (#) (S.E)	All (S.E)	*t-value*[a/*] *(p- value)*
Insemination costs	**67 (23)**	**150 (44)**	**108 (25)**	1.671 (.01)
Veterinary costs	**107 (31)**	**189 (65)**	**147 (36)**	1.139 (0.26)
Dipping costs	**171 (72)**	**217(49)**	**194 (44)**	0.520 (0.60)
Purchase of animal drugs	177 (32)	221 (46)	199 (28)	0.783 (0.43)
Others	18(5)	21 (6)	19 (4)	0.260 (0.72)
Total costs	541(116)	798 (150)	667 (95)	1.361(0.18)

Source: This survey, 2003

Table 9: Livestock products earnings by type of household

	Affected households (S.E)	Non-affected households (S.E)	All (S.E)	*t-value*[a/*] *(p- value)*
Milk	2,016 (1341)	5,414 (76)	3,683 (1,539)	1.104 (0.27)
Eggs	495 (419)	174 (75)	338 (216)	0.740 (0.46)
Honey	125 (112)	186 (114)	155 (87)	0.352 (0.73)
Others	52 (41)	0	26 (20.69)	1.25)
Total	2,688 (1,401)	5,774 (2,812)	4,202 (1,553)	0.994 (0.32)

Source: This survey, 2003

Table 10: Livestock Population for affected and non-affected

	2000		2001		2002		2003	
	Affected	Non-affected	Affected	Non-affected	Affected	Non-affected	Affected	Non-affected
Cattle	3	2	3	2	3	2	3	2
Goats	2	3	3	3	4	3	4	3
Chicken	10	12	13	13	14	16	10	13

Source: This survey, 2003

3.6 HIV/AIDS and food security

The observed association between HIV/AIDS and lower crop and livestock production may imply a worsening food security status for affected households. Indeed food balances were found to be lower for affected households. While 35.9% and 46.2% of the households had exhausted their first and second main food crops respectively, about 41% of the affected households had exhausted the first main food crop compared to 31% of the non-affected households (Table 11). For the second main food crop, 54.6% of the affected households depleted their previous harvest compared to 37.5% of the non-affected. Asked the source of the current stocks of the main food crops, affected households had a stock of 1.44 bags of maize from own production and 0.17 bags from other sources compared to 2.08 bags and 0.11 bags respectively for the non-affected. Although the differences are not highly significant, affected households have less stock from own production and higher stock from other sources. Possible explanations for the depletion of food stocks may be associated with low production or sale of harvests to cater for other households needs including medical expenditure.

Table 11: Food Security

Number of Households with Depleted Stocks				
Type of crop	*Affected (Number)*	*Non-affected (Number)*	*Total (Number)*	
Food crop 1	44	32	76	
Food crop 2	59	39	98	
Current Maize Stocks by Households (Bags)				*t- statistics*[a] *(P-value)*
Own production	1.44 (0.24)	2.08 (0.40)	1.76 (0.24)	1.3757 (0.17)
Other Sources	0.17 (0.05)	0.11 (0.04)	0.14 (0.03)	0.9318 (0.35)

Source: This survey, 2003

3.7 Health expenditure and coping strategies

In the absence of health insurance systems for most Kenyans, households are responsible for paying health care costs incurred by its members. Survey results show significant differences in annual medical cost between affected and non-affected households. The affected households spent about Kshs. 5,254 anually on medical care and Kshs. 13,804 on hospitalization (Table 12). The non-affected households spent Kshs. 1,643 and Kshs. 2,999 on medical care and hospitalization respectively. Funeral costs were about Kshs 12,674.

Table 12: Cost of annual Health Care (Kshs) for affected and non-affected households

Variable	*Affected (N = 100) (S.E)*	*Non-affected (N =104) (S.E)*	*t- statistic (P-value)*
Medication costs	5,254 (893)	1,643 (429)	3.60 (0.0004)
Hospitalization costs	13,804 (5176)	2,999 (1031)	2.01 (0.046)
Total medical costs	19,053 (5244)	4,642 (1126)	2.64 (0.009)

Source: This survey, 2003

The burden that these costs place on the resources of the households can lead to asset disposal, withdraw of children from school and alteration of economic activities. In this study, we had hypothesized that the affected households sell their assets to mitigate HIV/AIDS shocks. Previous studies found a large reduction in assets holdings when households experienced adult mortality (UNAIDS 1999; Kelly, 2001).

3.7.1 Disposal of Livestock and other household asset

The results show affected households to have sold more livestock than the non-affected households (Table 13). In most cases, goats, sheep and chicken were sold more than cattle. This is in line with other studies that show lumpiness to limit the role of assets in consumption smoothing (Rosenweig and Biswanger, 1993). Within a period of one year, 35.2% of the affected households sold cattle and 36.1% and 32.4% sold goats/sheep and chicken respectively. For the non-affected households, 26%, 23.1% and 35.6% of the households sold cattle, goats/sheep and chicken respectively. Affected households sold an average of 4 goats/sheep compared to 3 for the non- affected and could have become poorer by the value of the livestock sold.

Affected households were also observed to be selling other households assets to take care of medical costs. About 13.9% of the affected households sold their assets ranging from land, plots, and houses to bicycles and approximately 80% of those who sold had medical expenses as the main reason of selling assets. Only 8.65% of the non- affected households sold their assets (Table 14). Although the reasons for selling assets across types of households are not statistically significant, they may indicate the effects higher medical cost may be having on household wealth. Apart from these negative effects on current wealth, the future welfare of HIV affected members is also threatened given the fact that affected households seem to have higher school drop-out rates (5%) than the non-affected (9%). However, the rates are only significant at 60% (t=0.48).

Table 13: Reason for sale of livestock

	Affected (%)	Non-affected (%)	All (%)
Cattle	**35.19**	**25.96**	**30.66**
Goats/Sheep	**36.11**	**23.08**	**29.72**
Chicken	**32.41**	**35.58**	**33.96**
	Affected (number)	**Non_affected (number)**	**All (number)**
Cattle sold	**2**	**1**	**2**
Goats/Sheep sold	**4**	**3**	**3**
Chicken sold	**11**	**11**	**11**

Source: This survey, 2003

Table 14: Reasons for selling assets

	Affected s% (S.E)	*Non-affected % (S.E)*	*t-value[a/*] (p- value)*
Sale of assets	13.89 (0.033)	8.65 (0.028)	1.201 (0.231)
Reason for selling asset - Medical	80.00 (0.118)	77.78 (0.167)	0.334 (0.742)
Reason for selling asset - School fee	26.67 (0.107)	33.33 (0.147)	0.124 (0.902)

Source: This survey, 2003

3.7.2 Savings and credit

Apart from effects on the physical assets, HIV/AIDS could undermine holding of financial assets. In this survey, there were more non-affected households (67%) with some form of savings than affected households (58%) (15). Affected and non-affected households had an average savings of Kshs. 5,515 and Kshs. 8,072 respectively which are significantly different at 90% level.

Much of the savings held were in the informal financial institutions. These included co-operative societies, self-help groups and Rotating Savings and Credit Associations (ROSCAs). About 33.5% of the households had household members who are members of local groupings. Across the two types of households, 29.6% and 37.50% of the affected and non-affected households respectively had a least a member of their households in these groupings. Although we did not ask the reasons for not joining credit and savings group, stigmatization could prevent AIDS affected people from joining. The fear of inability to pay loans may also prevent others joining affected members. Although this may not be the only reason, affected households were found to also borrow less that non-affected. About 14% of the affected households had their members apply for credit in the last 12 months compared to 16.4% for the non-affected households. Credit applications were for different purposes ranging from school fees, medical, household needs to farming. For those who applied for credit in the affected households, majority applied to cater for medical expenses (40%). On the other hand, 17.7% of the credit applicants from the non-affected households intended to use it for medical expenses and 29.4% for farming. This may explain the differences in purchased input usage. However, only the difference on the use of credit for education purpose across households' types is statistically significant. But the differences could be indicative of rising significance of health cost in affected households over other investments.

Table 15: Membership to savings and credit groups, household savings and loans and reasons for borrowing

	Affected (S.E) N= 108	*Non-affected (S.E) N= 104*	*All (S.E) N= 212*	*t-value[a/*] (p- value)*
Member of local groupings (%)	29.63 (0.04)	37.50 (0.048)	33.49 (0.033)	1.21 (0.227)
Application for credit (%)	13.89 (0.03)	16.35 (0.036)	15.09 (0.025)	0.4975 (0.619)
Received credit (%)	12.04 (0.03)	14.42 (0.034)	13.31 (0.023)	0.511 (0.6100)
Average savings (Kshs)	5,515 (891)	8,072 (1232)	6,769 (759)	1.69 (0.0924)
Use of Credit				
	Affected N=32	*Non-affected N= 32*	*All N=32*	
School fess (%)	0	29.41(0.114)	15.63 (0.065)	2.42(0.022)

Medical expenses (%)	40.00 (0.13)	17.65 (0.393)	28.13 (0.074)	1.0837(0.17)
Household needs (%)	20.00 (0.11)	23.53 (0.106)	21.88 (0.74)	0.234(0.82))
Farming (%)	13.33 (0.091)	29.41 (0.114)	21.88 (0.74)	1.0837(0.29)

Source: This survey, 2003

3.8 Regression results

Regression results by district and controlled for location differences are shown in Appendix I. In the analysis, Mbeere and Tharaka districts are combined since they have similar climatic, soils and agricultural characteristics. Certified seeds, household size and household land holdings are positively correlated with household crop output value but a negative correlation is observed for years of education of head of household. Though not significant this may be explained by the fact that in subsistence farming, the level of education may not be a strong factor in production and years of farming experience may play a more important role. Hence the significance of loss of middle age adults in preservation of inherited farming knowledge.

As expected, there is a negative relationship between HIV/AIDS and crop production and the coefficients are statistically significant for Kitui and Mbeere/Tharaka districts. Being an affected household reduces crop output/value by about 39 % and 52 % in Kitui and Mbeere district respectively. In Meru Central, HIV/AIDS is negatively related to crop output value but the results are not statistically significant. This may be explained by other factors prevalent in the District such as rainfall and soils, which have more influence on crop output. Meru has good soils and higher rainfall compared to the other sample districts and has a greater variety of crops. For instance, regression results on maize production show a positive relationship between volcanic soils, which are prevalent in Meru Central, and maize production compared to the Sunday soils of Tharaka and Mbeere (Appendix I).

4. Conclusion and Policy Recommendations

The study tried to examine the extent to which AIDS has impacted on agricultural production, incomes, and food security. Annual and per capita crop incomes for the affected household are about 72% and 68% of the affected households respectively. The regression results also suggest a negative association between HIV/AIDS and crop production. Factors likely to explain the low crop production by the affected households include less cultivated area and less intensification. The fact that agricultural production in the drier zones of Mbeere and Tharaka seem to be more affected by HIV/AIDS than the higher potential areas of Meru suggests the need for special programmes for Arid and Semi-arid Areas (ASAL).

In the absence of formal insurance mechanisms, households resort to sale of assets including withdraw of children from school, all which increases their vulnerability to poverty. Indeed, poverty depth and severity are higher in affected than non-affected households. This implies that poverty reduction strategies need to incorporate HIV/AIDS interventions at all times.

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Appendix I: Ordinary Least Squares (OLS) Results by District

All crops - Dependent variable: Is the log of total household crop value									*Maize production - Dependent variable: Is the log of total household crop value*	
	Meru Central		*Kitui*		*Mbeere/Tharaka*		*All districts*		*All districts*	
Variable	*Coefficient (S.E)*	*t-value*	*Coefficient (S.E)*	*t-value*	*Coefficient (S.E)*	*t-value*	*Coefficient (SE)*	*t-Value*		
Certified seeds dummy	**3.06 (0.890)**	**3.41**	0.343 (0.268)	1.28	0.226 (0.546)	0.41	2.139 (0.583)	3.67	0.412 (0.211)	1.95
Log household size	**0.115 (0.804)**	**0.14**	0.859 (0.291)	2.95	0.423 (0.259)	1.68	0.295 (0.420)	0.70	0.282 (0.184)	1.53
Log household land holding per capita	0.735 (0.468)	1.57	0.863 (0.217)	3.98	0.534 (0.236)	2.26	0.719 (0.236)	3.05	0.355 (0.145)	2.45
HIV/AIDS Dummy (= 1 if household was affected)	-0.002 (0.711)	-0.00	-0.386 (0.177)	-2.18	-0.515 (0.200)	-2.58	-0.357 (0.26)	-1.38	-0.041 (0.129)	-0.32
Animal/tractor dummy(=1 if animal or tractor was used)	0.672 (0.783)	0.86	0.156 (0.245)	0.64	0.336 (0.218)	1.54	0.352 (0.220)	1.60	0.037 (0.171)	0.22
Head of household years of education	0.486 (0.424)	1.15	-0.0776 (0.111)	-0.70	-0.404 (0.109)	-0.70	0.172 (0.144)	1.20	0.030 (0.078)	0.39
Loam soils (= 1 if the soils are loam soils							-0.227 (0.317)	-0.72	0.649 (0.318)	2.04
Volcanic soils (= 1 if the soils are volcanic)							-2.189 (0.739)	-2.96	0.586 (0.337)	1.74
Log maize price									0.211 (0.030)	7.02

constant	6.634 (1.475)	4.50	8.750 (0.687)	12.78	9.728 (0.414)	23.53	9.570 (0.635)	15.08	-0.417 (0.367)	-1.14
Location controls	Yes		Yes		Yes		Yes		Yes	
R^2	0.3368		0.4383		0.3852		0.3086		0.3698	
No. Of observations	70		70		72		212		212	