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MITIGATION OF THE IMPACT OF HIV/AIDS ON RURAL LIVELIHOODS THROUGH LOW-LABOUR INPUT AGRICULTURE AND RELATED ACTIVITIES

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TERMS OF REFERENCE

MITIGATION OF THE IMPACT OF HIV/AIDS ON RURAL LIVELIHOODS, THROUGH LOW-LABOUR INPUT AGRICULTURE AND RELATED ACTIVITIES

Purpose
To provide advice and support to rural communities and those working with them on how to respond effectively to the impact of HIV/AIDS on rural livelihoods.

Background
One of the specific features of the AIDS pandemic is that it strikes particularly at the economically active age group in afflicted communities. It therefore has a dramatic impact on agricultural production, rural livelihoods and food security.

Over the years, extensive research has been undertaken by many organisations on labour-saving crops and agricultural techniques. The great majority of research was not done in the context of AIDS but in a more general attempt at reducing demands on labour, especially in Africa. However, it has transpired that the results of this work are not available in any easily accessible format to be offered to those working with AIDS-afflicted communities.

The intention of the present initiative is therefore to bring together as much of the existing work as possible, and to prepare a draft advisory paper which offers a range of practical options to AIDS-afflicted communities and indicates where further details of each of those options may be found.

The assignment
The work should include all agricultural options, including (but not limited to) choice of crops, seed varieties, intercropping, minimum tillage, reduced weeding, tools, fuel-efficient stoves, processing activities, etc.

The first stage of the work will comprise a desk and internet review of existing materials, to be obtained from such sources as the CGIAR centres, ITDG, CTA, FAO, and many others. Limited travel may be necessary in order to complete this work successfully.

Field work will then take place in at least two African countries with high rates of seroprevalence

Outputs
The written outputs from this assignment will contain at least five parts:

(i) a policy guidance note for decision-makers. This will provide a brief definition of the problem, outline key issues and recommend possible strategies.

(ii) A detailed analysis of agricultural problems arising from the impact of HIV/AIDS on rural communities, providing illustrations from case studies

(iii) A detailed review of existing knowledge on low-labour input agriculture, including an assessment of relative successes and failures in what has been tried to date

(iv) Clear practical guidelines which may be offered to AIDS-afflicted communities and those working with them, which present options on choices of crops, tools, etc and indicate where further details may be accessed.

(v) Indicate what sort of local institutional strengthening would be appropriate to support this work, and how development agencies might most effectively contribute to this.

EXECUTIVE SUMMARY

This report addresses the following questions:

1. What is the evidence that HIV/AIDS has had an impact on rural livelihoods?
2. If there is an impact and what form does it take?
3. What indigenous responses are apparent in HIV/AIDS affected rural communities?
4. If "new" or "appropriate" labour economising technologies are available how probable is it that such innovations might be adopted by people in HIV/AIDS impacted communities?

We now provide the answers:

1. What is the evidence that HIV/AIDS has had an impact on rural livelihoods?

There can be little doubt about the impact of HIV/AIDS on rural livelihoods in central, east and southern Africa. Impact in West Africa is just becoming evident. We need to know more about the situation in dryland areas and in regions beyond Africa. We know little about rural impact in India, western China and the colder regions of Central Asia and Russia.

2. If there is an impact and what form does it take?

The normal response has been to downshift the rural economy to a survival mode. While this is possible for all, the effects on the poor and very poor are to make them destitute. Recovery potential is limited and may mean that this process is a one way street.

3. What indigenous responses are apparent in HIV/AIDS affected rural communities?

Most responses involve downshifting or reallocation at the Labour Allocation Interface. At the household level this is more easily done by the richer than by the poorer and the poorest. Among the poor (whose numbers increase) there is a move to responses which include employment or self-employment, sometimes in activities that increase individual and household risk. There is very limited evidence of responses which have anything other than short term effects.

4. If "new" or "appropriate" labour economising technologies are available how probable is it that such innovations might be adopted by people in HIV/AIDS impacted communities?

Most indigenous responses are for short to medium term survival rather than long term development. We do not know what, how and when to introduce by way of LETs. The key problem is that the period of innovation and adoption is likely to be overtaken by the pace of the epidemic. The only truly labour economising technology is provision of ARVs.

What are the Policy Options?
The options are very limited because:

- HIV/AIDS prevention interventions are extremely difficult and take a long time with very mixed results as evidenced by the explosion of infection in Africa. There is absolutely no reason to sure that prevention programmes will enable many areas with elevated seroprevalence levels to avoid the impact of the epidemic.
- Provision of relief to some areas may be necessary in the short term but such relief activities will have to take account of the following: (a) the recovery process will be longer than expected and may extend to ten years or more (b) food supply and recovery planning will take place in circumstances of changed demography.
- The sole policy intervention that can strengthen resilience and therefore recovery capacity and thus have an immediate and long term effect on food security is provision of anti-retroviral drugs. Establishment of a system to provide these drugs will also enable enhanced engagement with the TB and malaria problems. Above all, ARV treatment will ensure continuing availability of labour in the rural sector, continued care of children and most important that communities can reproduce themselves socially, economically and nutritionally. This is the path that leads to development and independence rather than dependence and destitution.

The Options
The possible options for actions are::

1) Do nothing
2) expand social protection
3) Expand social protection with the “stairway” approach described above
4) Introduce labour economising technologies
5) Introduce labour economising technologies with “stairway” approach
6) Introduce labour economising technologies with social protection and “stairway” approach
7) Introduce ARVs
8) Introduction of ARVs with social protection
9) Introduce labour economising technologies with ARVs
10) Introduce labour economising technologies with ARVs and “stairway” approach
11) Introduce ARVs with social protection and labour economising technologies and “stairway” approach

To consider these possibilities in more detail.

1) **Do nothing:** If nothing is done there will not be a cataclysm. Insofar as most of the infections in high labour dependent farming systems are in Africa, few outside that continent will take alarm at the progressive deterioration of rural livelihoods in the face of HIV/AIDS. Recurrent food shortages, insecurity and more frequent and long term famines

will merely attract more emergency appeals and crisis intervention. The longer-term costs of such neglect by rich countries cannot be known but they can be envisaged and could be substantial.

2) Expand social protection: This will be a short term relief activity which, while necessary, will have limited long term consequences and do little to mitigate the long term effects of labour loss. This course of action would require ever increasing budgets to assist the steadily growing numbers of rural destitute and rural refugees who had fled to towns seeking assistance. This would be unsustainable and would result in a similar situation to 1 – but delayed by a few years.

3) **Expand social protection with the "stairway" approach:** This would buy some time but not mitigate the long-term problems. It would not build for the future.

4) **Introduce labour economising technologies:** This might work in the long term but we do not know whether and where it works, nor do we have a shelf full of known technologies which are appropriate for these circumstances. There may be some patchy successes but there will not be a generally useful and effective intervention that safeguards food security. The rate of growth of the rural destitute will be marginally reduced. This approach will however only ensure that more "projects" are developed.

5) Introduce labour economising technologies with "stairway" approach: This would have the same limitations as 4 but would have the additional advantage of perhaps limiting social exclusion and destitution.

6) Introduce labour economising technologies with social protection and "stairway" approach: This remains limited but extends beneficial effects into a medium term.

7) Introduce ARVs: the logistic and cost challenges of any strategy that includes ARVs are considerable. However, the question of "cost" has to be rethought. Prices of ARVs are falling and recognition of the constituents (particularly the hedonic constituents) of "cost" (and therefore benefit when the cost is avoided) is expanding (Moatti et al, 2003). We are also beginning to see results that show that ARVs can be used in resource poor settings. If we are to speak of "labour economising" we should recognise the possibility that ARVs do truly economise on labour as they are literally labour **saving**. In saving lives they enable people to be economically and socially productive, to care for children, to participate in the lives of their communities and to govern themselves effectively. For these reasons, it could be argued that to introduce any labour economising technology without saving the labour through provision of care is an extraordinary mis-use of resources. An ARV strategy is not a solution: it is merely a window before viral resistance gets out of hand. However, that window is longer and more certain than any other window currently available. ARVs could also be an important part of a new type of prevention programme which goes beyond the rhetoric of moral discourse to a realistic assessment of personal risk through voluntary counselling and testing (VCT) and a reason to change behaviour. The ARV route also has the advantage of bringing investment to the health sector in

general and developing vertical structures for delivery of other health benefits.

8) **Introduction of ARVs with social protection**: This strategy is probably as effective as 4, 5 and 6 inasmuch as we do not know how or whether many labour saving technologies work and in what time frame. In contrast treatments do work and do save and social protection measures through transfers to households (particularly to women but also to men) have the advantage of leading to market driven solutions of the technology **and** the care problems simultaneously – or of other solutions decided by recipients. This is one of the major advantages of the fungibility of such schemes.
9) **Introduce labour economising technologies with ARVs:** Gives labour economising technologies a chance to work; in the absence of ARVs their impacts where possible will be limited by the difficulties of adoption discussed in this report.
10) **Introduce labour economising technologies with ARVs and "stairway" approach:** Has the advantages of 7, 8 and 9 with addition of an inclusive approach which maintains social cohesion and builds for the future.
11) **Introduce ARVs with social protection and labour economising technologies and "stairway" approach:** The deluxe option which literally saves labour, gives the labour economising technologies a chance to be developed and adopted while providing people with market led possibilities through social protection and social inclusion via the stairway approach.

INTRODUCTION

The aim of this project was to provide advice and support to rural communities and those working with them on how to respond effectively to the impact of HIV/AIDS on rural livelihoods. In particular, it aimed to examine the availability and appropriateness of any existing labour saving or labour economising technologies.

It is logical to approach this task via a number of prior questions. These are:

5. What is the evidence that HIV/AIDS has had an impact on rural livelihoods?
6. If there is an impact and what form does it take?
7. What indigenous responses are apparent in HIV/AIDS affected rural communities?
8. If “new” or “appropriate” labour economising technologies are available how probable is it that such innovations might be adopted by people in HIV/AIDS impacted communities?

This report attempts to provide answers to these questions.

SECTION 1: HIV/AIDS IMPACT

It is very probable that people in Africa have been dying from HIV/AIDS for some decades given the period elapsed since this zoonotic infection (Hahn, B.H. et al, 2000) crossed species (Korber et al, 2000; Lemey et al, 2003; Hooper, 1999). The condition came to the attention of western medicine in 1981 (Morbidity and Mortality Weekly Report, 1981; Gottlieb et al., 1981; Barre-Sinoussi et al., 1983) and was reported from Africa soon thereafter (Serawadda et al., 1985). Given that this disease is predominantly heterosexually transmitted, it was fairly obvious that it had serious implications for society and economy and in particular for systems of production which were heavily dependent upon human labour. Nowhere was this likely to be more true than in rural livelihood systems in poor countries and in particular in Africa. The problem was particularly pronounced in Africa where the disease rapidly attained epidemic proportions in a number of countries in the central and eastern part of the continent in the 1980s and where, in contrast to many parts of Asia and Latin America, there had been no “green revolution”.

Two pieces of research explored this problem. A small-scale simulation study using farm management data was undertaken by FAO (Gillespie, 1989) and a field study funded by DFID in 1989 (Barnett, Blaikie and Obbo, 1990; Barnett and Blaikie, 1992). The conclusions of these studies were straightforward and to a degree predictable: unusual levels of death and illness in mature adults would restrict labour inputs to livelihood activities. The more difficult the environment in terms of climatic or soils constraints, the more acute and pronounced the effects of the epidemic. Wherever such effects were seen, richer households would be more able to cope than poorer, and within households both gender and age were likely to be strong modulators of income and asset effects. Further than this it seemed likely that there would be systemic effects whereby cropping and husbandry patterns would alter to accommodate labour constraints resulting from the increased illness and death.

These early conclusions have since been confirmed by studies in several African countries. Although it is not possible to attribute a *causal* role to HIV/AIDS, there seems little doubt that recent and current food shortages in Southern Africa have been made worse by the long-term consequences of the epidemic. Twenty years of the epidemic have reduced the resilience of many societies. It seems very likely that we are now seeing the results of this increased vulnerability to the effects of any shocks such as poor rainfall or flood. ***Reports from some areas suggest that the effects of this reduced resilience manifest themselves at "medium" rates of seroprevalence, for example around at around 13 per cent in Rakai District, Uganda in 1989*** *(Barnett and Blaikie, 1990)* ***and similarly in Benue State, Nigeria in 2001*** *(van Liere et al**.,** 2003)*.

This is not the place to review the evidence that has now accumulated about the ways that HIV/AIDS affects rural livelihoods. White and Robinson (2000) have in any case completed this task very effectively. To update and contextualise that review it will suffice to note some of the main items in what is now an extensive set of original studies and reviews (Barnett and Blaikie, 1990; Gillespie, 1989; Barnett and Haslwimmer, 1995; Topouzis and du Guerny, 1999; Mutangadura, Mukurazita and Jackson, 1999; Mutangadura and Webb, 1999; Rugalema, 1999; Rugalema, Weigang and Mbwika, 1999; Tibaijuka, 1997; Engh, Stouklal and du Guerny, 2000; Waller, 1997; Black-Michaud, 1996; Topouzis, 1988; Kwaramba, 1997; CARE International in Malawi, 2002). Most recently, a robust study has described the situation in Kenya (Yamano, Jayne and McNeil, 2002; Yamano and Jayne, 2002) and this study in general confirms all other findings.

In the face of this now large and steadily growing literature there can be little question of the extent and nature of HIV/AIDS epidemic impact in the rural sector in much of Africa. The forthcoming DFID study of Benue state in Nigeria (van Liere et al, 2003) shows that similar processes are already well advanced in at least some parts of West Africa. We must therefore conclude that in Central, East, Southern and West Africa the HIV/AIDS epidemic has had already had serious effects on the rural sector. This impact continues

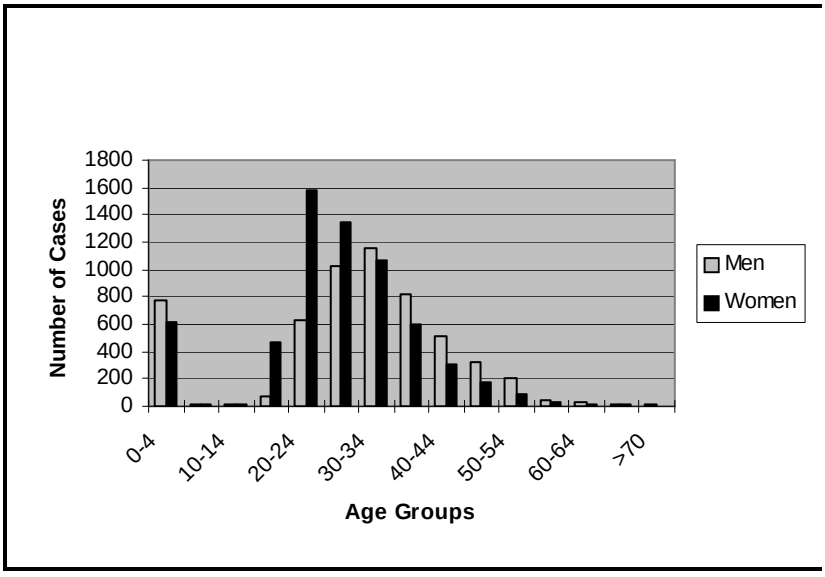
and we do not yet understand its full extent nor do we know how to respond to it. This report is a contribution to that process of response.

Implications of HIV/AIDS for Food Security and Rural Livelihoods

Some readers might ask why **this** disease should be given so much attention when there are many other threats to health. In addition to the vast numbers of people infected and its role as the leading cause of mortality in Africa four features of the disease and its epidemic manifestation and effects serve to indicate why HIV/AIDS has implications more serious than many other diseases. These are:

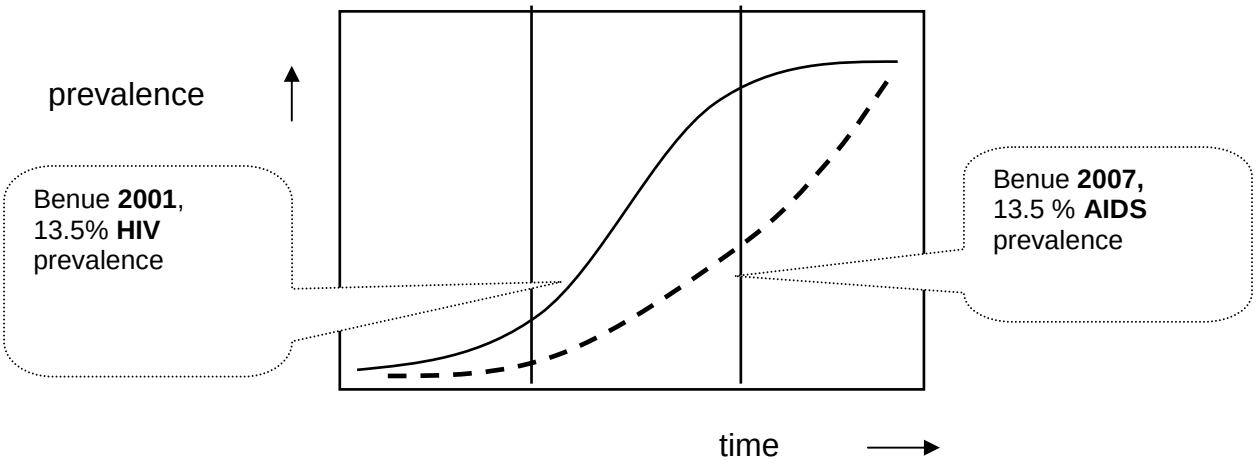
1) In Africa HIV/AIDS is almost exclusively heterosexually transmitted. The other main transmission route is mother to child transmission either *in utero* or through breast-feeding. This pattern of transmission is clear from Figure 1. This shows the concentration of infections in the age groups that are most likely to be more sexually active.

Figure 1 Age and Gender Distribution of AIDS cases in an African Population



2) Most reports on the epidemic focus on **prevalence of infection** because diagnosis, reporting and recording of AIDS cases is problematic[1]. It must be understood that the reported seroprevalence give a picture of the **future** state of the epidemic of morbidity and mortality in an area. Thus a "mere" five per cent seroprevalence will be five per cent illness and death in a relatively short period[2]. To illustrate this we can take the case of Benue State, the state with probably the highest level of infection in Nigeria at 13.5 per cent of the adult population in 2001. Figure 2 shows that 2001 seroprevalence level will translate into illness and death by around 2007. It is only then that the full effects of this *medium* level of epidemic will be seen in the food and rural livelihood system.

Figure 2 The Transition from Seroprevalence to AIDS in Benue State



However, this is not the end of the story. The epidemic is unlikely to stabilise at 13.5 per cent in Benue, in Nigeria or elsewhere. In rural African circumstances, the "natural" saturation level of this epidemic is probably between 20 and 30 per cent of the adult

[1] For an explanation of why this is so, see Barnett and Whiteside, 2002, chapter 2.
[2] Evidence from the long term cohort study in Masaka, Uganda now suggests that the mean time to transition from initial infection to AIDS defining illness in Africa is probably around 8.5 years (Whitworth et al., 2003).

population cohort. The South African epidemic moved from less than 1 per cent to 25 per cent in 20 years. Prevention interventions have limited effectiveness and are particularly limited in the absence of top level political support, social and political stability and reduced social inequality (Barnett and Whiteside, 2002). This means unusual levels of morbidity and mortality in rural areas – some of which are already seen in Benue[3] – with their consequent impact on food security[4].

3) **Demographics:** it has been apparent since the early 1980s that theoretically this epidemic would affect **population growth rates** and size. It seems very likely that this has already happened and that in affected regions, population has grown at a lower rate than without the epidemic. However, its effects on population **structure** were not so clear and did not catch the attention of observers until comparatively recently. These structural changes first became apparent in 1989 (Barnett, Blaikie and Obbo, 1990). How widely such changes will happen in other parts of Africa is now debated. The most recent research indicates that the so-called "chimney effect" on population structure may be happening but does not necessarily occur in all countries. The reasons for the possible differences between countries are not yet clear (Heaton and Stanecki, 2003). It is quite likely that the absence of the "chimney effect" in census data from some east and southern African countries reflects the age of the data in relation to the progress of the epidemic at that time or it may indicate some other as yet poorly understood population dynamic. However, Figure 3 (Low-Beer, Stoneburner and Muluku, 1997) shows the **actual** *(derived from census data)* effects of HIV/AIDS on population structures in Uganda at about the same levels of rural **seroprevalence** as now seen in Benue. Figure 4 illustrates the

modelled effects of HIV/AIDS on national demographics in Botswana within the next decade and should provide food for thought in relation to the future rural effects in Nigeria and elsewhere.

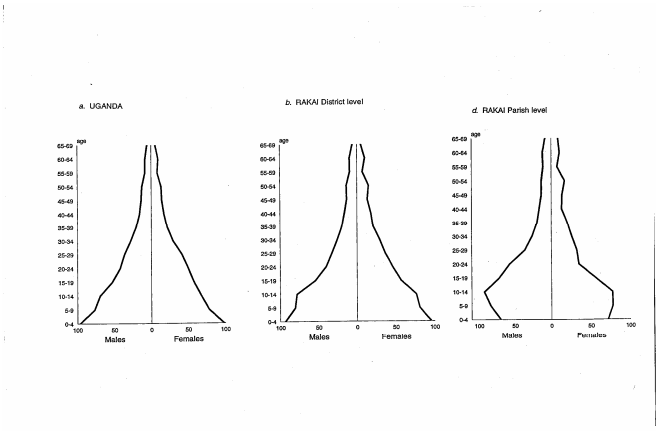


Figure 3 Demographic Change in Uganda - Census Data 1992

[4] While we would not favour the use of the term “famine” - new variant or otherwise – to describe these processes, there is quite clearly a new situation (De Waal and Whiteside, 2003)

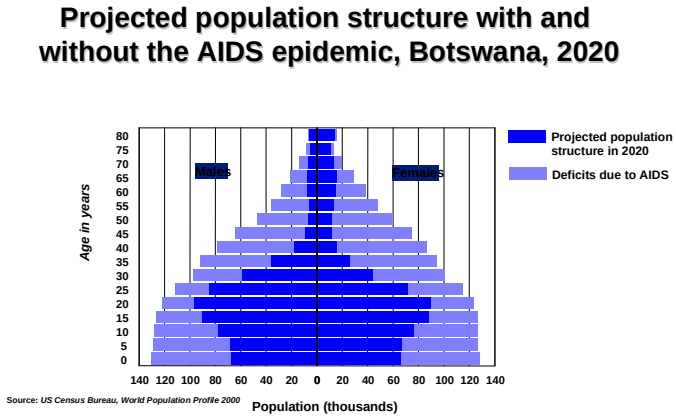


Figure 4 Botswana: Projected Population Structure with and without the AIDS Epidemic in 2020

4) **Loss of Life Expectancy:** Figure 5 shows the effects of HIV/AIDS on life expectancy in a number of African countries. This means that people's decision horizons are likely to become truncated resulting in a mixture of short term risk taking and short term risk avoidance. The former may have implications for the epidemic if it encourages young adults into sexual experimentation because they believe (correctly) that they have little hope for the future as they are likely to be infected. The latter has implications for food security as it discourages investment and passing of information and knowledge about farming from generation to generation. Together, these two aspects of lost life expectancy mean that the net result for food security is adverse in the extreme.

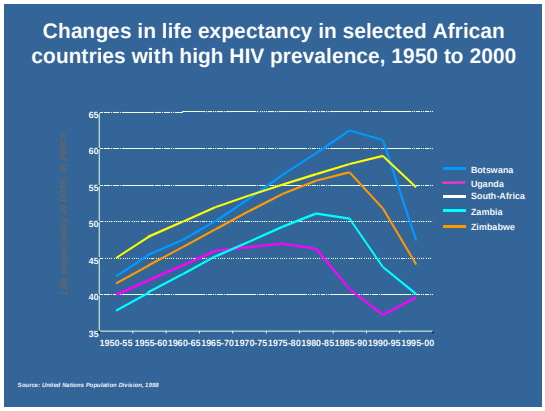


Figure 5 HIV/AIDS Related Loss of Life Expectancy in Some African Countries

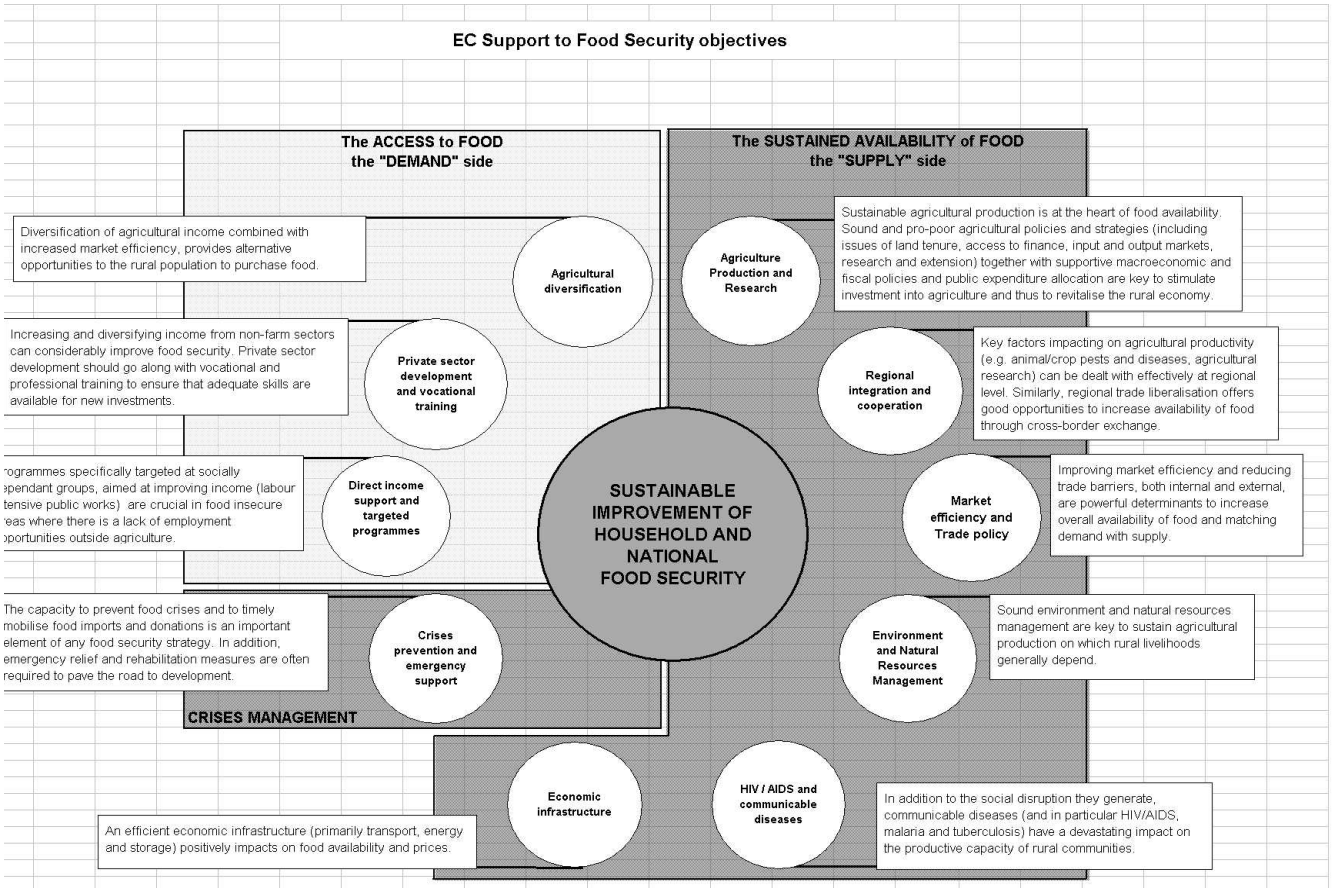


Figure 6: The EU Perspective on HIV/AIDS and Food Security

Implications for Food Security

Here we summarise the ways in which the HIV/AIDS epidemic appears to be affecting agriculture, household livelihood strategies and hence food availability and security.

To the extent that HIV/AIDS morbidity and mortality impoverishes households it threatens food security which consists of a number of components:

- food should actually be available
- people should have access to sufficient food
- supplies should be stable
- food should be of good and dependable quality.

Households are **food secure** when all four of these elements are in balance. Instability in one or more elements renders households vulnerable to food insecurity.

Food security is the outcome of: food production using mainly family labour, land and other resources; food purchase using household income; availability of assets and social claims – being able to borrow an implement or a worker at short notice. Own production takes precedence and provides the bulk of food consumed by most rural households. Food is an important source of food especially for complementary and nutritious foodstuffs (which includes protein sources such as fish or meat; minerals, like salt; vitamins, found in fruit and vegetables) which cannot be produced on the farm. Assets such as livestock can be turned into food or cash if need be, while social claims facilitate non-market inter-household exchange of food and other goods and services.

Adult morbidity and mortality may affect one or all of the elements of food security. Even minor health problems may have significant knock-on effects if they incapacitate the household member long enough to disrupt the farming cycle. Illness of productive adults is especially feared among farm households; it reduces the labour supply suddenly and has short and long-

term consequences. This is particularly so when we take into account the crucial **seasonality** of agricultural work.

HIV/AIDS affects food security by reducing household ability to maintain a diverse portfolio of activities and to produce and buy food. It results in loss of assets and severe decline in the insurance value of social networks. The sicker your family member becomes, the more money you may have to borrow from relatives and friends, the more you may seek their assistance. In the end they say “no more” (Lundberg and Over, 2000).

A farming household’s first response is to adopt “downshifting” measures - changes to the number and range of crops grown. Observed choices have included sacrifice of cash crops for food crops and leafy crops and fruits for starchy root crops. In Uganda in the late 1980s, people reduced their work on coffee that required pruning and marketing in favour of their staple, bananas. Then they cut down on the bananas and vegetables and concentrated on easily cultivated and stored cassava. This is a classic survival change in cropping systems where high value and nutritious crops are progressively substituted for by poor value root crops.

Other labour economising adjustments were observed in Uganda as early as 1989. These included: hoeing by moonlight (in violation of an explicit sanction against such activity), reducing duration of mourning ceremonies, reducing the number of people considered eligible for mutual assistance within the “family”, withdrawal of children from school, reduction of women’s trips to the water source, extended and more intensive use of child labour (Barnett and Blaikie, 1990, 1992), sale of assets such as bicycles and, in Bukoba, Tanzania, even the straw from the house roof (Rugalema, 1999). Similar labour and asset economising adjustments have been reported from all over Africa in the intervening period, most recently from Benue state in Nigeria (van Liere et al, 2003). The point to note is that these: (a) are indigenous responses which economise on labour (b) enable coping to occur (c) are often but not always and not necessarily “one way streets” which may lead not to extended “coping” and recovery but to destitution.

We should note that the HIV/AIDS epidemic compromises the accumulation and maintenance of many types of asset. Among these compromises is care and husbandry of livestock. These are disposed of to generate cash for care and treatment of the sick, slaughtered for consumption during funerals, taken away from survivors by other family members, deliberately de-stocked because of shortage of labour, or they may die because of poor management. Loss of livestock implies loss of manure for the farm and loss of products such as milk meat and eggs for the family. It means liquidation of important savings for many households.

In many cattle-keeping communities, people share the care of their animals with friends and relatives over a wide geographical area. This reduces risk of loss in the event of disease or theft. As with reduced crop range on the arable side, so reduction of the range of domestic animals kept or withdrawal from such risk pooling arrangements are all symptoms of the way that AIDS impact makes a household, cluster[5] or community more vulnerable to the next traumatic event.

HIV/AIDS may adversely affect the care of livestock and expose them to disease. The same may be true of crops, where poor human health means poor cultivation and ultimately poor disease and pest control.

This latter hypothesis points to another pathway through which HIV/AIDS may affect entire farming systems and human nutrition. Such changes may go unnoticed and unreported. Those whom these affect have little influence; and government and agencies lack the perspective to track events of this sort. It is of greatest importance that governments, multilateral and bilateral agencies take seriously the need to monitor farming system changes as a result of HIV/AIDS. This is necessary if one of the long-term effects of the epidemic is

[5] We use the term “cluster” here because the “household” may not be the effective welfare/coping unit. Drinkwater has used this term and this analytical approach and operationalised it in his component study to Barnett and Haslwimmer, 1994.

not to be a steady reduction of rural communities' ability to provision themselves – a process already far advanced in parts of Southern Africa.

Policy Implications of these processes

The implications of this situation are that the policy and intervention paradigm must alter to take account of dramatic changes which are now in train but the effects of which will endure for many decades to come. Figure 6 shows a particular representation of the modalities required for sustainable food security as perceived in the EU[6]. The arc of round white circles in the diagram shows some of the factors that might and do impact upon food security. However, what we must understand is that HIV/AIDS is represented as one among these circles. This is an incorrect representation because in fact HIV/AIDS must be seen as a factor **endogenous** to all of them. Thus, for example:

- Agricultural diversification becomes problematic under conditions of reduced labour availability, quality and skills
- Private sector development and vocational training becomes problematic as instructors, students and trainees are affected by illness and death and skill levels and returns to training and education are reduced
- Direct income support and targeted programmes have to occupy themselves more with social support than with "development"
- Crisis prevention and emergency support becomes longer term as the epidemic and its impacts occur over a time period of around 30-50 years in the absence of ARV interventions
- Economic infrastructure is affected at all levels and in most sectors
- Environmental and natural resource management becomes difficult as rural infrastructure is affected by lower labour availability, less skilled labour and reduction of already scarce local resources

[6] Blower, Uwe, Food Security at the Heart of Poverty Reduction Strategies, European Commission, Brussels, 25 February 2003, p.11.

- Market efficiency and trade policy: market operations are affected by loss of key players such as indigenous credit providers and loss of key market participants from rural households
- Agricultural Production and Research: seriously affected at all levels as rural households have to accommodate labour loss through illness an death and research institutions lose key staff.

In other words, sustainable improvements in household and national food security become very hard to maintain in an HIV/AIDS endemic environment. It is precisely this situation which means that the issue of potential labour economizing responses to the impact of the epidemic is problematic. It is a complex set of questions which raises issues far beyond those of rural livelihood systems and agriculture. The problematic turns out to extend into the ways that the policy environment conceptualises the problem.

The Environment: the Scale of the Problem and the Possibilities

There is now a dawning understanding of the magnitude of the impact of this epidemic. Absence of a vaccine and the challenges of providing ARVs within existing infrastructures in poor countries as well as continuing and serious price obstacles to their supply mean that mitigation must be a priority in any pro-poor policies for the rural sector in Africa. This will also be so for other world regions where rural livelihoods are major components of population survival. Evaluation of the availability and appropriateness of labour saving technologies in relation to HIV/AIDS impact may form an important component of the response.

Difficulties with food production lead to poor nutrition, both protein-energy malnutrition and deficiencies in micro-nutrients such as iron, zinc and vitamins. Poor nutrition leads to compromised immune systems, making individuals more susceptible to infection in general (Morris and Potter, 1997; Chandra, 1997; Beisel, 1996; Scrimshaw and SanGiovanni, 1997). These links are a facet of a risk environment[7] with links back to the global economy. HIV infected individuals have higher nutritional requirements than normal, particularly with regard to protein (up to 50% increase), and energy (up to 15%). Illness may precipitate appetite loss, even anorexia, thus reducing dietary intake at a time when requirements are higher. Such interactions are thrown into stark contrast for the poor, and particularly the rural poor, who are more likely to be malnourished prior to becoming infected[8]. Onset of disease and death might be delayed in well-nourished HIV positive individuals. Diets

[7] Barnett and Blaikie, 1992, chapter 5.

[8] In Nigeria, for example, many people are severely undernourished. Thus, the following table (Barnett and Love, 2003) shows the situation for children and for mothers with a body mass index below 18.5. We should note that in the UK "normal" BMI is taken to be in the range 20-30.

Region	Children Height for age, % below -2SD	Mothers BMI % below 18.5
Northeast	55.2	25.0
Northwest	57.0	18.0
Southeast	35.3	6.5
Southwest	38.9	19.9
Central	53.1	8.4

rich in protein, energy, and micronutrients help in resisting opportunistic infections. Thus for rural populations, the impact of HIV/AIDS on farming, farming systems, rural livelihoods and nutrition is potentially serious. It has been largely overlooked in the focus on prevention.

Despite its apparent low share in global output, agriculture and its associated activities is probably the main livelihood of more people than any other economic endeavour. If we consider urban and rural residence as a partial indicator of involvement in agriculture, then the picture is clear. Globally 54 % of the population lives outside urban areas. In low-income countries 70% of people live in rural areas; in South Asia and Sub-Saharan Africa the percentages are 72% and 67% respectively. FAO estimated (FAOSTAT) that globally 2,575,456,000 people lived and worked in agriculture in 1999, the last year for which information was available. The agricultural population of Africa in 1999 was estimated at 430,962,000, that of India 553,227,000. These figures may under-estimate the numbers of people for whom subsistence agriculture is the main prop of their livelihood strategy and also those for whom it is a minor but important part. **Figure 7** shows that Africa is the continent in which people are most food insecure.

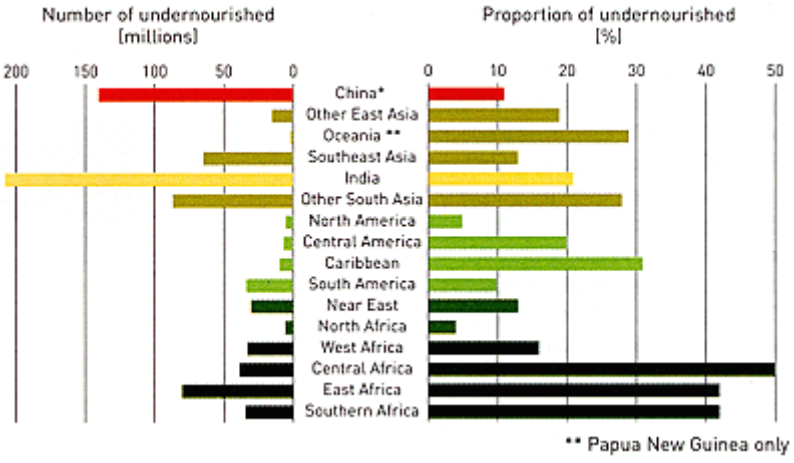


Figure 7 Number and Proportion of undernourished people by world region and sub-region, 1996-98

Source: FAO, The state of food insecurity in the world 2000

Source: Nigerian National Demographic Household Survey 1999. Tables 9.6, 9.7

In late 2000, of the 32 countries in the world recorded as facing exceptional food emergencies, 16 were in Africa. There is a predictable association between HIV/AIDS, poor data, and civil unrest and food insecurity.

The Context of the HIV/AIDS Epidemic

HIV/AIDS is not an isolated event. A number of contemporary processes occur alongside. All have major consequences for rural life and economy. Many are very slow and difficult to plot and measure. They include:

- Structural adjustment policies
- Long-term food insecurity
- Environmental and / or climatic change
- The absence of a "green revolution"
- The crisis of state legitimacy.

We will briefly discuss each in turn.

Structural Adjustment Policies

The effects of "structural adjustment policies" (SAPS) have an amplitude of between 10 and 50 years. There was more than one form of structural adjustment. The earliest most extreme forms were replaced by structural adjustment "with a human face". These tried to target safety net assistance to those most disastrously affected. The effects of these policies have been widely discussed and debated. Undoubted increases in both rural and urban poverty may actually have assisted the spread of HIV although this hypothesis cannot be substantiated[9].

Structural adjustment policies may have had some positive impacts at the national level and in urban areas. Most rural areas and communities were not able to respond to price signals because of institutional, infrastructural, and political obstacles. In some cases, structural adjustment raised agricultural

[9] For an examination of the overall relationship between structural adjustment policies and the development of HIV/AIDS epidemics, see forthcoming paper Barnett and Blackwell, 2003.

output prices, mainly by removing parastatal middlemen, but they also increased input prices. The net effect was that rural commercial producers were probably marginally worse off, having paid the price of increased uncertainty and adjustment as the policies came into force. But rural subsistence households and communities (who were not selling in the market) faced dramatically increased prices for all their purchases.

Poverty Reduction Strategy Papers (PRSPs) have succeeded SAPS. These aim to focus development efforts on poverty alleviation, learning lessons from the experiences of structural adjustment. Many low-income countries preparing PRSPs are badly affected by the spread of HIV. This has been widely recognised, especially by the World Bank. Given that PRSPs are supposed to be country specific, participatory and to focus on both short term and long term development goals and indicators there is the potential to change the way in which HIV/AIDS is addressed. It is too early to say whether PRSPs will succeed in their goal of reducing poverty. Some critics fear that despite good intentions national AIDS bodies and donors must lobby governments to ensure that the PRSP approach does in fact move beyond rhetoric and supports efforts to address the HIV/AIDS epidemic. **In relation to the concerns of this report, it is absolutely vital that PRSPs both address HIV/AIDS in general and explicitly take into consideration the issues addressed here.**

Food Insecurity

Africa is the only continent in which overall per capita food supply has fallen over the past 30 years (FAOSTAT, 2001).

Table 1 Per Capita Agricultural Production by Broad Region in Africa 1965-2000[10]

Agriculture (PIN) Net Per-Cap PIN 89-91	Year							
	1965	1970	1975	1980	1985	1990	1995	2000
Africa Developed	105.3	104.6	110.1	113.3	99.4	98.0	77.4	89.1
Africa Developing	111.7	114.1	107.8	98.2	96.4	98.0	99.4	100.5

Source: FAOSTAT Database, various years.

Few observers see any hope of medium term improvement, even without the HIV/AIDS epidemic. The problem for many communities is not an overall food shortage. It is rather a problem of insecure and maldistributed food supply.

Absence of a Green Revolution

In Asia the "green revolution" – a combination of improved seed varieties, fertiliser and irrigation - resulted in increased yields when it was introduced some thirty years ago. It should be noted that this was in many senses a labour intensive process: increased output resulted in increased labour demand at harvest. It enabled commercialisation of agriculture with consequent increases in productivity and yield. No similar package has been successfully developed for Africa. The institutional, political and economic structures to enable such change have not been present. In the absence of a green revolution, the following two points become more pressing. First is continuing evidence of climatic change; second is the issue of legitimate government.

[10] PIN stands for Product Index Number, a unique identifier used for each crop in the FAO system. For further information see: (http://apps.fao.org/lim500/nph-wrap.pl?Crops.Primary&Domain=PIN&servlet=1)

Climate Change

Climate change has manifested itself as decreased and less predictable rainfall in parts of Africa. Opinions differ as to whether this is a long term or cyclical change. Whatever the case, the effects of global climate change are likely to hit Africa hard. African agriculture is 85-90 per cent rain-fed, typically makes up 40 per cent of GDP and is a major component of most countries' export earnings. The continent is vulnerable to short-term climatic variation. This seems to be increasing in Southern Africa and has considerable costs for poor households. Southern Africa is likely to experience more extremes: droughts and floods. Other parts of the continent will also experience wider climatic fluctuation than has previously been the case. The major river basins, with the exception of the Congo, may become water scarce. Increased evapo-transpiration in the arid north of the continent may lead to further and more rapid desertification. This will mean shorter growing seasons and thus increased vulnerability to loss of labour as the timing of agricultural operations becomes less flexible. In West Africa, more frequent and longer dry periods are expected. In east and central Africa agricultural capacity will decline and increased temperature and humidity is likely to create conditions for expanded ranges for malaria, sleeping sickness and other infectious diseases of plants, animals and humans. In Africa climate change appears as an additional factor, another long wave event, which will combine with HIV/AIDS impact to challenge the agricultural base of the continent.

State Legitimacy and the Role of Government

The issue of political legitimacy and what governments can do for rural areas is fundamental. Agriculture policy change has to be "induced" (Hayami and Ruttan, 1971). This requires two basic political conditions: that government is able to act and that it is perceived as legitimate so that it may act. This is a key insight in relation to the concerns of this paper. Innovation and adoption of technologies is a complex matter. This is discussed further below. Here we merely note that introduction of new technologies as a response to the HIV/AIDS epidemic depend on:

(a) the existence of such technologies
(b) their acceptability and appropriateness
(c) the possibility of their adoption within a time frame faster than that of the epidemic
(d) government or NGO capacity to make the introduction in co-operation with local communities.

With regard to the government component, political legitimacy is a long-term problem in most parts of Africa. While some states are clearly competent and effective – as in the case of Botswana and South Africa, others are not competent. The writ of government may not run far from the capital and its right to govern may be contested. At worst, as in the Democratic Republic of Congo, Liberia, Somalia, Sierra Leone, Angola and other countries, war or extreme civil unrest may have been a “normal” condition for decades. This makes it difficult for societies to respond to any problems or crises; and the polity itself may be and often is the source and focus of crisis and struggle. Political uncertainty makes it hard for small farmers to cultivate, improve land and animals, and market produce.

SECTION 2: THE PROBLEM IS NOT SIMPLY "TECHNOLOGY"

There are no magic bullets that will "solve" this problem. There are only more or less effective interventions which involve technologies, and which may be more or less likely to offer benefits within a time frame consistent with that of the epdemic and its impact waves. The problem is wider than "technology". For these reasons this report must be seen as part of a wider process of restrategising rural livelihood policies across DFID with additional relevance to the perspective adopted by FAO[11] and other agencies within the UN as well as other actors in the bilateral "systems". In fact it is highly desirable that this restrategising be undertaken on a broad front and across agencies at both country and international level. After all, it is odd to preach multi-sectoral response to the epidemic and for donors then to fail to practice what they have preached! **A clear policy recommendation is closer and more integrated work on this problem between agencies and governments at national and international levels. This might be done informally at country level but the process now requires further development. This might be under the auspices of UNAIDS, FAO or via some other mechanism.**

There are two points of departure:

(1) DFID and other agencies have tended to work within a strategy that implies a continuum from emergency relief through rehabilitation to "development";

(2) HIV/AIDS impacted rural communities are characterised by radically altered demographic profiles, large numbers of orphans and vulnerable children and HIV/AIDS impacted NGO and governmental support services.

The second of these points means that the first has to be rethought.

This is above all because an HIV/AIDS epidemic is a "long wave event"[12] with many implications for rural livelihood policy and thus the work of agencies

[11] A draft report to assist FAO in its strategic planning was prepared by Barnett and Topouzis in February 2003 (Barnett and Topouzis, 2003). This section derives in part from that document.

[12] Barnett and Blaikie, 1992, p. 56 ff.

engaging with the welfare of the rural poor. Within this long wave event, particular food and other livelihood "emergencies" inevitably become manifest from time to time. These will take different forms and have particular features depending on the following:

(a) location of a society or region on its "national" epidemic curve;
(b) type of farming system;
(c) characteristic types of livelihood strategy;
(d) demographic starting point.

This latter is of importance when non-African societies are taken into consideration. Some of the Central Asian societies where serious epidemics seem likely in the next five to ten years have demographic structures with already adverse dependency ratios, as do parts of China[13].

A revised strategy will have to review options for a period of thirty years or more and recognise that food emergencies in HIV/AIDS impacted countries are a "new" or at least "different" kind of food insecurity, although probably inappropriately described as "famines". This is because of the altered base from which households, communities and perhaps whole societies are able to respond. At the very least, pre-existing and "traditional" "coping mechanisms" are no longer effective and the response-recovery period will be much longer than had previously been the case – or in some cases not possible at all with the growth of a new and large component of the rural "destitute". In addition and more specifically, the labour supply to recovery strategies, labour and commodity market environment, and even in some cases natural environment, particularly infrastructural environment, will have altered. We know something of these changes in east, central and southern Africa but very little about what may be happening in West Africa and particularly dry areas such as the Sahel.

In these circumstances, consideration of the role of labour economising technologies (LETs) is of the greatest importance and has links to the other components of the current DFID initiative, namely: loss of agricultural knowledge, mitigation strategies to assist community

organisations and institutions in responding to the epidemic, promotion of gender equality in relation to HIV/AIDS impact, and the provision of social protection. Each of these policy areas involves familiar issues of adoption, extension, replicability and interconnectedness. Labour economising technology will not of itself be a "solution" to the long term effects of HIV/AIDS on rural communities and their livelihoods. For example, existing labour economising responses or material technologies may not be appropriate to societies with large numbers of child headed households. However, taken together, the different components will offer vital insights to further our understanding of how to respond to this novel, long-term and as yet poorly-understood "new" kind of crisis in poor rural communities in. For the moment we are dealing with this problem in Africa but similar responses will most probably be necessary in other world regions within the next decade.

Above all, we must recognise that HIV/AIDS is no longer a familiar development problem among others. It is a new phenomenon which questions whether development is possible and if it is, how it is to be done. The specific characteristics of this new situation include the following:

- High adult HIV/AIDS prevalence rates
- High levels of AIDS related illness and death
- Cumulative, systemic impact will span 2-40 years in many affected countries.
    - i. The crisis develops over a very long period. This means that there is a choice:
        - Fail to act because it is happening slowly (which is what has occurred so far), or
        - Respond now so as to change the future
        - Respond pro-actively in areas not yet visibly affected
    - ii. Recovery potential is diminished by the HIV/AIDS epidemic:
        - community structure is weakened, safety nets break down

[13] Barnett, 2002

- because in mature epidemics women are affected by HIV/AIDS more than men, the gender balance is altered. Thus, assumptions about the availability of women's labour and skills for household and farm work will not hold.
- dependency ratios are made worse
- many adults who are alive are sick, thus the technical dependency ratio based on counting living individuals appears better than the "real" dependency ratio derived from counting active adults available to work.
- Working adults have to care for those who are sick and the days are punctuated by funeral obligations

iii. Long term demographic changes alter the technical response possibilities: changed gender and age balances in a population will challenge existing technologies and roles which are based on assumptions about the age/gender balance of "typical" communities

iv. The contours of destitution are redefined and now include the very young and the very old, and among these women in particular. The numbers of destitute people in rural areas are also increasing – people whose destitution reflects inability to access resources or decreased ability to use available resources as a result of weakened social, economic and in some cases, environmental, infrastructure

v. HIV infection tends to cluster in families, households and communities. This means that AIDS-related destitution will affect some communities more than others.

vi. Generalised seroprevalence measures are not fine-grained. They obscure the ways that communities and households within them are selectively affected by HIV/AIDS and subsequently impoverished.

vii. In most situations of advanced food insecurity men have died in greater numbers than have women[14]. This has implications for recovery and coping responses. In a mature HIV epidemic, more women than men are infected. This is likely to result in a different distribution of capabilities, technical competencies and culturally mediated expectations of caring and management roles.

The implications of these changes for any kind of intervention and work with rural communities are as follows:

i. The starting point for intervention–by governments and agencies is different from what it has ever been before. The demographic base of communities has changed, household labour and skill profiles have been impoverished and community safety nets have been weakened.

ii. Assumptions about social networks and community safety nets have to be reviewed. Pre-existing structures and institutions may be impaired or will have ceased to function.

iii. A particular skill loss is women's knowledge of how to survive in adverse conditions – the importance of this is currently apparent from our interviews in Zimbabwe where we were told that unattractive roots have nutritional value but are known and gathered only by women.

iv. Expectations for the future: all previous recoveries have been underpinned by expectations of a better future. This may not be the case in the context of an HIV/AIDS epidemic where the foreseeable recovery time may exceed most human life expectancies. Many rural populations may have had their morale sapped and lack the subjective capacity to recover. In such circumstances, personal, household and community strategic planning becomes difficult to commence or sustain.

In a society impacted by a mature epidemic and other crises, such as drought or flood, the process of strategic withdrawal from full production to gathering wild foods may accelerate from a year or two to mere months or even weeks. This situation demands that ability to respond is similarly rapid and in place before the process commences.

In most of Eastern, Central and Southern Africa, we are seeing one part of this long wave event, a full-fledged, long-wave emergency. This is only the first such emergency: others will be nested within the larger curve of the long wave event. Such an emergency cannot be resolved by short-term injections of food aid and agricultural inputs (seeds, tools, etc.)**.** This new category of emergency has specific characteristics with critical implications for food security. We do not know the full extent of its potential duration. This observation is important for the substance of the present report.

The idea of "labour economising" technologies raises many issues. Among the most important is whether or not their successful development and adoption can be achieved in circumstances that have not been seen before and therefore confront households and communities (and also policy makers and the international assistance community) with new and uncharted territory. The temptation is and will be to assume that the past is a good guide to the future. In fact, the history of **induced** agricultural innovation and adoption in Africa during and since the colonial period does **not** demonstrate that these processes of innovation and adoption have been either well understood or effective. There is a sustainable argument that in Africa most major innovations and adoptions have not been induced, they have rather been indigenous[15]. In addition, we should note that:

- we are once again dealing with familiar problems of the *adoption* and *relevance* of innovations
- that these problems have rarely been adequately dealt with in non-AIDS attempts at "development" over the last 50 to 100 years
- we should not expect the task to be easier in an HIV/AIDS environment.

Furthermore, we have little basis to assume that:

a) there is category of things called "what has worked" or
b) that if there were they would work under these changed conditions.

We must also consider the possibility that the category of "deliverable" needs to be rethought and that these might not be technological *"things" so much as social and political <u>processes</u> which will enable engagement with the problems in the newly changed/changing environment.*

With these questions in mind, we can now turn to some key questions in relation to the HIV/AIDS epidemic. These are:

[15] Major indigenous innovations include the adoption of the banana-maize crop combination in the C 7, and the development of groundnut and cocoa production on a very large scale in West Africa (notably in Ghana, Nigeria and Senegal) in the C19 and early C20. The development of the coffee-banana system in Buganda shows elements of induction by the colonial agricultural service.

- Whether or not there are in fact any indigenous responses to the labour shortages and bottlenecks created by the epidemic?
- If there have been any, what are they and are they transferable and can they be scaled up?
- Are there any existing technologies that offer solutions and are these transferable and can they be scaled up?
- What do we understand by the term “technology” in this context?

Labour Economising – a special case of input substitution

Here we situate the problem by examining the ideas of input substitution, innovation and adoption.

What do we mean by “labour economising”? This is not at all a simple question. To elucidate the issues we will briefly review some basic principles in neo-classical economics. This will assist us to understand clearly the conceptual, theoretical and in the end practical constraints in using the idea of “labour economising”.

The idea of labour economising has its origins in the basic neo-classical notion of a “production function”. This concept relates inputs to outputs and takes note of the ways that at certain stages, additional increments of inputs result in diminishing marginal returns to the input and even negative return. Hence, addition of ever more fertiliser to the same patch of ground does not result in ever increasing output of crop. Instead, after a certain point the marginal return per unit of fertiliser begins to decrease and later still the return is less than the additional cost of fertiliser. Thus we can conclude that in general a production function describes the technical or physical relation between output and one or more variable inputs. Most importantly in this conceptualisation, all other resources involved in the production function *are assumed to remain constant.* This is the *ceteris paribus* assumption.

Three things may be added to further explain the possibilities and limitations of the production function as a way of conceptualising this problem. First it is assumed that there is a base level of output which would occur without any additional input; second there is a highest level of output which occurs before diminishing marginal returns set in for that input; third, diminishing marginal returns are inevitable. In addition to these features the neo-classical theory of the firm/farm assumes further that (a) there is only one decision-maker and (b) the single goal of the production unit is short-term profit maximisation.

From this framework comes the important and relevant idea of *substitution* sometimes described as the *law of variable factor proportions*. This latter term focuses clearly onto the idea of substitution. Substitution is the core of the analysis of changes in techniques of production and this in turn leads directly to the idea of labour economising and low labour input agriculture as a possible response to labour lost to the HIV/AIDS epidemic. In terms of neo-classical economic conceptualisation, low labour input agriculture is merely a special case of technology choice in the farm/firm. The notion of substitution has certain features including that: (a) the input combinations may be varied infinitely in relation to each other (b) the marginal rate of substitution tends to diminish as one factor replaces another. This is called the *diminishing marginal rate of substitution*.

Taken together these concepts allow us to understand the *logical* principles of technological change. The particular combination of variables adopted on a farm or in a firm will be determined by the single decision maker seeking maximum short term profit in relation to the price array of the inputs and the price obtainable for outputs.

The problem is that this framework is quite limited as it assumes a single decision-maker, short term profit maximisation as the single goal and the existence of markets. In the world of technical changes in peasant/smallholder farming with which we are largely concerned, while the

framework is of some assistance, we also have to take account of major deviations from the conceptual framework. These include: (a) multiple decision makers, goals and interests in a household, which is likely to be differentiated at least by age and gender (b) imperfect or no markets (c) the lumpy[16] nature of technology (d) goals which are alternative to short term profit maximisation and which may include satisficing or minimaxing. Above all, given the higher infection rates among women than men in mature epidemics, the presence of large numbers of orphans among which will be a high proportion of young women, there will be particular problems for women in adopting labour saving technological responses. Thus, for example, the ability of women to adopt labour saving technologies is limited by gender asymmetries (Dey-Abbas, 1997; Seeley, Sutherland, Dey and Grellier, 2003) whereby access to land, tools, credit, social networks may all be mediated through men, where control over assets (including people) and income may require men's co-operation. Even in some cases a technology may be designed with men's physique in mind rather than that of women. This points to the problematic nature of technical change in general and in particular in relation to targeting women for technical change. In the present case where women occupy such a central role in African agriculture and rural livelihoods, this should demonstrate just how complex will be advocacy and adoption of low labour input approaches to agriculture. Furthermore, the question of low labour input agriculture has to be seen in relation to the more general issue of farm power in the Africa. It is a sub-set of that general discussion. A forthcoming report for FAO[17] puts the problem of farm power in sub-Saharan Africa in the following context. The author writes:

> "At the beginning of the new millennium, rural livelihoods in many parts of sub-Saharan Africa are under considerable stress. Economies and the political environment are experiencing a period of significant transformation through liberalisation, decentralisation, and downsizing

[16] A "lumpy" technology is one that requires substantial investment and cannot be scaled down.

[17] This section has benefited enormously from advance sight of a draft report from the Agricultural and Food Engineering Technology Service (AGST) of the UN Food and Agriculture Organisation. We are grateful to Mr Lawrence Clarke and Ms Clare Bishop-Sambrook for allowing us access to this material at this stage prior to its finalisation.

> of government activities. In many countries, poverty remains endemic with a significant proportion of their rural population living below the poverty line, per capita incomes stagnant, and life expectancy is often, at best, static. Agriculture remains at the core of rural livelihoods and has a major influence on livelihood outcomes. Farm power is one of the most crucial inputs in the production process, determining the area cultivated and the volume harvested, and improvements in farming methods invariably require a greater application of power. Factors that reduce the availability of farm power from any source – be it humans, draught animals or tractors – threaten the viability of rural livelihoods. This is exactly the challenge facing many parts of sub-Saharan Africa at present. The final two decades of the twentieth century were characterised by the collapse of DAP[18]-based farm power systems in parts of eastern and southern Africa, and the closure of many tractor hire services throughout the region. At the very time when many communities were reverting to hand power, the agricultural labour force was beginning to feel the impact of the HIV/AIDS epidemic, compounded by the effects of improved access to primary education and persistent migration. In an era of deteriorating markets for many cash crops, increasing claims on households' meagre financial resources (for school fees and medical treatment) and the removal of support for purchasing farm inputs, many rural livelihoods are under severe stress. An understanding of the interaction between farm power and livelihood outcomes is central to promoting sustainable rural livelihoods."[19]

This points to important implications. We have already indicated the broadly adverse environment in Africa for rural livelihoods. To this we must not only add the HIV/AIDS epidemic but a general reversion to manual power as availability of tractor and animal power declines.

It is in this context that we now turn to the second problem, that of adoption and innovation.

Adoption and Innovation

One of the most robust findings of the economic theory of innovation diffusion is that shifts from one technology or product to another follow a sigmoid curve describing the numbers of people adopting an innovation over time. This process was influentially described and analysed by Everett Rogers in his book *Diffusion of Innovation* (Rogers, 1962). This

[18] DAP – Draught Animal Power

book remains influential. The phenomenon is explained by the idea that for any innovation there are innovators, early adopters, followers and laggards. The frequency distribution of these types of person over time is described by the sigmoid curve. The largest group is the "followers". Such "types" of people can be distinguished in terms of various social, cultural or emotional characteristics but above all in terms of their orientation to risk. Some of the limitations of this approach were critically evaluated long ago by Hutton and Cohen (1975) and it has been extensively revisited (reviewed in Ruttan, 1996, also see: Raiffa, 1968; Arrow and Fisher, 1974; Purvess et al, 1995; Saha, Love and Schwartz, 1994; Feder and O'Mara, 1982; Feder et al, 1985; Binswanger et al., 1980; Binswanger, 1980).

The main ideas of this model[20] are that diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. An Innovation is an **idea, practice, or object** perceived as new by an individual, group or other unit of adoption, while a technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome. We should note here that within the Rogerian framework technologies are assumed to have two components:

1. **"hardware",** consisting of the tool that embodies the technology as a material or physical object. This may in turn be divided into: the distinction between innovations that are

    a) *embodied* in capital goods or products (such as tractors,fertilizers, and seeds) and those that are
    b) *disembodied* (e.g., integrated pest management schemes)

2. **"software"**, consisting of the knowledge base for the tool. The software information embodied in a technology serves to reduce one type of uncertainty, that concerned with the

[19] Draft FAO document p. 1.
[20] We use this model not because it tells a "truth" about innovation and adoption but rather it provides a starting point for this specific discussion. Not all innovations follow a sigmoid curve and the processes may turn out to be far more complicated than assumed by the Rogers approach.

cause-effect relationships involved in achieving a desired outcome.

There is also a third component, not dealt with by this school. This is the **social setting** within which the technology is to be used. Here there is a high degree of variability within which the hardware and software can operate more or less effectively or at the same level in different social settings. **This is probably an important variable when we consider innovation and adoption in response to HIV/AIDS related labour shortages.**

Members of the adopting evaluate an innovation community in terms of five criteria. These are:

(1) relative advantage – what advantages it offers over existing technology
(2) compatibility with the ways people already do things
(3) complexity, how easy it is to use and maintain
(4) trialability, how easy it is to try it out (Pannell and Zilberman, 2001)
(5) observability, how easily its performance can be observed.

It is assumed that most individuals evaluate an innovation, not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation. Thus adoption is a social process. Innovations can be introduced by some kind of change agent who may or may not be a member of the local community but is more likely to be an outsider. Social characteristics – gender, age, ethnicity, class, status &c – may be of the greatest importance in determining the effectiveness of any change agents in relation to specific groups of potential adopters. Adoption of an innovation takes place over time and in relation to a specific social, economic and historical context. The time that an innovation takes to be adopted is critical in many situations where for example firms are competing with each other. However, in rural communities where households have been launched into poverty or destitution by death and illness and where seasonality is a

major factor, the pace of adoption is critical. It probably cannot go beyond one season; people do not have the resources to endure for longer than that.

The outstanding example of successful agricultural innovation and adoption has been the Asian “green revolution”. Here seed, fertiliser and irrigation packages have greatly increased food output over the past 40 years in some world regions. These technologies were not scale neutral and it appears that those people with existing asset bases, which enabled them to purchase the technology and take the risk, adopted most rapidly. The poor were least likely to be among the early adopters. In many cases they did not adopt at all either leaving the land and migrating to the cities or becoming wage labourers in local and regional labour markets which gave them a short term pay off from the innovation. With regard to the “green revolution” it is generally true to say that in Africa or in Asia, as in Europe and North America, it is the wealthy who innovate and adopt most rapidly and the poorest who innovate and adopt least readily. However, there is one important qualification to this statement. While the poor do not readily innovate and adopt new technologies at the cutting edge of production activities because they are inevitably risk averse given their limited margin for experimentation, they do in fact innovate and adopt in many other respects. The poor are *bricoleurs*: they make do and mend, they must have an eye for the opportunities offered by their material and social environment. They innovate through force of circumstances. The examples of coping responses – which might be described as “labour saving innovations” from Uganda and Tanzania, referred to above, demonstrate this point very clearly, as also in some senses do transactional sex, crime, migration and any other types of sale of own labour through employment or self-employment whether legal or illegal, moral or immoral.

SECTION 3: LABOUR ECONOMISING TECHNOLOGIES (LETs)

What Labour Economising Technologies are available and what can they offer in relation to HIV/AIDS Impact Mitigation?

Subsistence agricultural production involves, and is in turn affected by, a wide range of direct and indirect interactions between the social, political, economic and physical environment. Within subsistence agriculture a wide range of technologies, some more tangible than others, is utilised, for example in the form of tools, equipment and processes of cultivation. These technologies have discrete characteristics and utilise different resources and cannot be viewed in isolation from the context within which they are used. Hence the previous definition of technology in terms of hardware, software and social setting. Neglecting the importance of social and cultural influences on agricultural production and adaptation decontextualises their use from the wider but important issues of reduced labour capacity, social change and declining entitlements. Rather than providing a technical critique of technologies suggested as potentially labour saving in this section we focus on integrating selected policy, technical, case study and social sciences literature to provide a broader perspective on the implications of labour saving technologies in mitigating the impact of HIV/AIDS.

This review derives from publications of major donors working in the area of HIV/AIDS and food security. These are listed in **Table 2**. The geographical emphasis of the material reviewed is not restricted to the countries visited for the purposes of this study. It is of course influenced by the considerable bias of existing research towards Africa. In addition to this emphasis, there is a sectoral bias towards field-based subsistence agriculture. The literature did not much discuss fishing, forestry and pastoralism despite the probable high prevalence of HIV and increasing hardship due to the impact of the epidemic in many communities whose livelihoods depend on these activities.

Table 2: Main Source Databases

Institution	**Website address**
FAO (UN Food and Agriculture Organisation)	www.fao.org
DFID (Department for International Development)	www.dfid.gov.uk
CGIAR (Consultative Group on International Agricultural Research)	www.cgiar.org
CIAT	www.ciat.cgiar.org
IFPRI (International Food Policy Research Institute)	www.cgiar.org/ifpri
ISNAR	www.cgiar.org/isnar
CAB International	www.cabi.org
ELDIS	www.nt1.ids.ac.uk/eldis/agric/agric.htm
UNDP (United Nations Development Programme)	www.undp.org
SRI (Silsoe Research Institute)	www.sri.bbsrc.ac.uk
WUR (Wageningen University and Research Centre)	www.wur.nl[21]
University of Wisconsin-Madison	www.wisc.edu/wiscinfo
WFP (World Food Programme)	www.wfp.org

Labour saving technologies

Adult labour lost to illness and death can be partially replaced by withdrawing children from school[22] [23] but this has long term negative repercussions at both individual and societal level. Technical nterventions that may save labour at the domestic, farm, market labour interface (hereafter the **Labour Allocation Interface** or **LAI**) fall into the following categories:

[21]

[22] **NOTE: in this section we provide references in footnote format to ensure that often similar documents are identified in relation to the point being discussed. These items appear again in the bibliography at the end of the report.**

[23] FAO (2002) *Measuring Impacts of HIV/AID on Rural Livelihoods and Food Security* (Rome: FAO)

- Small-farm mechanization
- Low-input agriculture
- Improved tools
- Improved seed varieties
- Conservation agriculture
- Improved access to water
- Fuel efficient stoves [24] [25]

Although the use of technology in many activities is often perceived as minimal[26], if technology is viewed as a complex collection of equipment and processes its use becomes significant in domestic, market (as buyer and seller) and agricultural activities and at their interface, the LAI. Activities and technology in relation to this interface are highly cultural in their expression and thus substantially gendered. While relations of production, distribution and exchange around the LAI are likely to be heavily defined by local culture and politics, we must be clear that the relations within the interface are by no means inflexible, particularly under conditions of extreme and changing hardship (and also opportunity[27]). Uptake of new technologies or altering gendered patterns of use can, however, be difficult to achieve. The main barriers to adoption revolve around the limitations outlined in the preceding discussion of the process of innovation and adoption. They are:

- Lack of information
- Limited choice
- Poverty
- Time constraints
- Tradition
- Attitudes[28]

[24] FAO (2002) *Measuring Impacts of HIV/AID on Rural Livelihoods and Food Security* (Rome: FAO)
[25] Topouzis, D. (2001) *Strategy Paper on HIV/AIDS for East and Southern Africa* (Geneva: UNAIDS Best Practice Collection)
[26] FAO Agricultural and Food Engineering Technologies Service (2002) *Promoting Labour Saving Technologies and Practices for Farming and Household Activities Under Conditions of Labour Stress* (Rome: FAO)
[27] There are of course many examples of innovations in culture in response to opportunity, see for example Parkin, 1972.

Inappropriateness of technology is omitted from this list. Technology may be structurally or socially inappropriate and a clear divide appears to exist at present between the work of technical specialists working on "hard" technology and social scientists advocating the primacy of social protection. Greater collaboration between technical specialists and social scientists would give clearer insight into the process of adoption and/or rejection and increase opportunities to explore development of appropriate technological change in conjunction with, rather than separate from, strengthening and improving methods of social protection. Although a few projects are currently encouraging collaborative work[29] [30], the detailed findings of these projects are as yet unavailable. Hence this review is based on literature which tends to *dichotomise* technical and social HIV/AIDS mitigation strategies.

Here we provide a general description of the potential role of selected LETs. We also summarise different strategies for reducing labour inputs and coping with the impact of HIV/AIDS. This focuses on energy expenditure associated with different activities[31]. Most case studies focus on reductions or redistribution of time, or increases in output per person or per land area under severely constrained conditions[32] [33] [34] [35].

Conservation agriculture

The results of monocropping and continual cultivation in many countries, including parts of Africa, have led to problems in maintaining soil fertility,

[28] FAO Agricultural and Food Engineering Technologies Service (2002) *Promoting Labour Saving Technologies and Practices for Farming and Household Activities Under Conditions of Labour Stress* (Rome: FAO)
[29] Kim, J. et al (2002) Social Interventions for HIV/AIDS Intervention with Microfinance for AIDS and Gender Equity. Monograph No. 2: Intervention (South Africa: Rural AIDS and Development Action Research Programme)
[30] Loevinsohn, M, and Gillespie, S. (2003) *HIV/AIDS, Food Security and Rural Livelihoods: Understanding andResponding. Renewal Working Paper No. 2* (The Hague, ISNAR)
[31] du Guerny, J. (2002) *Meeting the HIV/AIDS Challenge to Food Security: the Role of Labour Saving Technologies in Farm Households* (Rome: FAO)
[32] Working Group: Agricultural Technologies (2003) *Agricultural Technologies: Case Studies* (SRPN Roundtable Meeting 27-29 May, Pretoria)
[33] Kienzle, J. (2003) *Mitigating the Impact of HIV/AIDS: The Labour Saving, Conservation Agriculture Entry Point* (SRPN Roundtable Meeting 27-29 May, Pretoria)
[34] Kienzle, J. (2003) *Labour Saving Technologies and Practices for Farming and Household Activities in Eastern and Southern Africa* (SRPN Roundtable Meeting 27-29 May, Pretoria)
[35] Kienzle, J. (2003) *Example of Mitigating HVI/AIDS in Agriculture and Rural Development* (SRPN Roundtable Meeting 27-29 May, Pretoria)

yields and, therefore, food security[36]. Conservation agriculture has successfully been used to overcome these problems in South America for a number of years but only since 1999 has it been established as an effective innovation in Southern Africa, while field trials are still ongoing in Eastern Africa.

Conservation agriculture is based on three key principles:

- Permanent soil cover - through the use of mulch, green crops or crop residues[37]
- Minimal soil disturbance - through zero or minimum tillage
- Crop rotation - to recycle nutrients, improve soil organic matter and reduce the risk of disease and pest damage[38].

The principles of conservation agriculture appear particularly relevant in this context. In time it reduces time and labour constraints as total time spent on land preparation and weeding (tasks frequently undertaken by women) are reduced[39]. CA enables other tasks to be spread over a greater period of time, which reduces the intensity of labour[40]. It is thus a LET.

While it is clear that in the long term CA may result in certain savings of time and energy, it also has substantial 'start up' costs such as the purchase of pesticides, herbicides and fertiliser before soil fertility is improved by crop rotation[41]. The period of transition between conventional and conservation agriculture is said to be approximately two years. **However, the full benefits of the system often become visible only after five years**. In addition during the first year or two, **labour requirements may be *increased*** by the need to

[36] Bunderson, W.T., Jere, Z.D., Hayes, I.M., Phombeya, H.S.K. (2002) *Landcare Practices in Malawi Publication No. 42* (Lilongwe: Malawi Agroforestry Extension Project
[37] Land and Plant Nutrition Management Service (2001) *Conservation Agriculture: Case Studies in Latin America and Africa*. FAO Soils Bulletin 78 (Rome: FAO)
[38] Land and Plant Nutrition Management Service (2001) *Conservation Agriculture: Case Studies in Latin America and Africa*. FAO Soils Bulletin 78 (Rome: FAO)
[39] Ashburner, J., Friedrich, T., Benites, J. (2002) 'Opportunities and Constraints for Conservation Agriculture in Africa' *LEISA* 18(3): 13-14
[40] IFAD and FAO (2002) *Labour Saving Technologies and Practices for Farming and Household Activities Under Conditions of Labour Stress* (Rome: FAO)
[41] IFAD and FAO (2002) *Labour Saving Technologies and Practices for Farming and Household Activities Under Conditions of Labour Stress* (Rome: FAO)
[41] Land and Plant Nutrition Management Service (2001) *Conservation Agriculture: Case Studies in Latin America and Africa*. FAO Soils Bulletin 78 (Rome: FAO)

produce quantities of green manure[42]. An indirect disadvantage of conservation agriculture is that it also reduces the availability of crop residues. These can be used for animal fodder, fuel, fencing etc [43]. Another disadvantage is that traditional planting equipment tends to become clogged by ground cover (www/fao/org/news2011103-ehtm) (www/fao/org/news 2011103-ehtm; ww/fao/org/ag/magazine/0110sp.htm) resulting in the need to purchase specialised planting tools. Work is currently underway exploring the development of improved planters (www.fao.org/nag/ags/agse/agse_e/general/ object.htm) and developing animal drawn equipment (Animal Traction Network for Eastern and Southern Africa - ATNESA).

As field trials in Eastern Africa are ongoing there is little published data on yields that can be achieved under a wide range of both optimal and sub-optimal conditions[44]. Results to date suggest that yields fluctuate less than under conventional agriculture, particularly during adverse climatic conditions[45], and that some yields have increased[46] [47]. It must be remembered that at the early stages of field trials participants are likely to receive substantial technical support from project staff and this may be reflected in the trial results. There is little evidence as yet of the long-term impact of sub-optimal management, climatic or social conditions on yields achieved without technical support from donors.

This leads to the question of sustainability. At present it is impossible to know whether conservation agriculture will continue to be used if and when donor support is withdrawn although the field trials have highlighted socio-cultural problems encountered by farmers adopting conservation agriculture. One is

[42] Land and Plant Nutrition Management Service (2001) *Conservation Agriculture: Case Studies in Latin America and Africa*. FAO Soils Bulletin 78 (Rome: FAO)

[44] IFAD and FAO (2002) *Labour Saving Technologies and Practices for Farming and Household Activities Under Conditions of Labour Stress* (Rome: FAO)
[45] Land and Plant Nutrition Management Service (2001) *Conservation Agriculture: Case Studies in Latin America and Africa*. FAO Soils Bulletin 78 (Rome: FAO)
[46] Kienzle, J. (2003) *Labour Saving Technologies and Practices for Farming and Household Activities in Eastern and Southern Africa* (SRPN Roundtable Meeting 27-29 May, Pretoria)
[47] Kienzle, J. (2003) *Example of Mitigating HVI/AIDS in Agriculture and Rural Development* (SRPN Roundtable Meeting 27-29 May, Pretoria)

the potential for free-ranging livestock to eat cover crops. Resolution of this problem may lead to increased costs in fencing or herding animals. Another potential problem is community pressure to maintain the 'clean' appearance of weeded and residue-free fields that traditionally indicate good management[48].

The need to develop new skills and purchase inputs if conservation agriculture is introduced reduces the possibility of its adoption by vulnerable households, whether impoverished by HIV/AIDS or for other reasons. Where communities are experiencing the impact of a mature epidemic the capacity for changing established farming systems might not equal the perceived need to do so *unless a very substantial period of support is provided*. Even if the challenges of investing labour, cash and other resources can be overcome, the risks are considerable. For these reasons, any attempting to introduce substantial changes to an agricultural system need to be accompanied by long-term technical support and adequate and carefully designed social safety nets.

Farm power

Where labour rather than land is a limiting factor of production the use of draught animal power (DAP) is frequently a long-standing feature of agricultural production. There is a large literature on DAP and the development of ergonomically improved equipment, while papers on animal traction in Eastern and Southern Africa can be found at: www.atnesa.org. Less information is available about its use as a labour saving technology in areas severely affected by HIV/AIDS.

Although the use of DAP is traditionally associated with men, part of the purpose of improving equipment by reducing size and weight[49] [50] and

[48] Kienzle, J. (2003) *Labour Saving Technologies and Practices for Farming and Household Activities in Eastern and Southern Africa* (SRPN Roundtable Meeting 27-29 May, Pretoria)
[49] Hange, A., Kakuru, E., Low, A., Bagnall-Oakley, H. (1999) 'The Impact of HIV/AIDS on Gender Burdens and Household Incomes in Kavango: Technology and Policy Implications' in G. Mutangadura, H. Jackson, D. Mukurazita (eds) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)
[50] Muchopa, C., Mutangadura, C. (1999) 'women, Agriculture and HIV/AIDS: Implications for Agricultural Policy and Mitigation Strategies' in G. Mutangadura, H. Jackson, D. Mukurazita (eds) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)

encouraging the use of smaller livestock such as donkeys is to encourage women's use of draught animal power[51] [52] [53] [54] [55] [56]. This, however, requires overcoming constraints of culture and tradition – another long-term process duration of which probably exceeds the epidemic's amplitude. Additionally, in many areas with high levels of HIV/AIDS numbers of draught animals are decreasing as livestock are sold to pay for medical expenses, funerals etc. As a result,

This increasing loss of cattle – at both regional and household levels - suggests that draught animal power is not likely to be sustainable other than in areas where its use is already well established or where very substantial long-term support is given to communities to encourage uptake, for example as in the work of ATNESA (www.atnesa.org). A very recent study[57] of the problem of farm power and sustainability across a range of farming systems in seven African countries, Ghana and Nigeria in West Africa, and Ethiopia, Malawi, Tanzania, Uganda and Zambia in Eastern and Southern Africa, concludes that:

> *In agricultural communities, the most fundamental livelihood outcome is food security. This is unattainable for most households relying on hand power, particularly just before harvest ….. Hoe cultivation imposes severe limitations on how much land these households can cultivate and the need to earn cash for survival draws them away from working on their own land at critical times of the farming season. Even if they grow enough to feed themselves, they are often obliged to sell a*

[51] Ncube, N.M. (1999) 'The Impact of HIV/AIDS on Smallholder Agricultural Production in Gweru, Zimbabwe, and Coping Strategies' in G. Mutangadura, H. Jackson, D. Mukurazita (eds) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)
[52] IFAD and FAO (2002) *Labour Saving Technologies and Practices for Farming and Household Activities Under Conditions of Labour Stress* (Rome: FAO)
[53] AGSE (1995) *Farm Power Considerations in Farming Systems in Sub-Saharan Africa* (Rome: FAO)
[54] IFAD (1998) *Agricultural Implements Used by Women Farmers in Africa* (Rome: IFAD)
[55] IFAD (1998) *Agricultural Implements Used by Women Farmers in Africa* (Rome: IFAD)
[56] Mutali, A. (1999) 'Challenges and Constraints of Animal Traction in Luapula Province, Zambia' in P. Starkey and P. Kaumbutho (eds) *Meeding the Challenges of Animal Traction* (London: Intermediate Technology Publications)
[57] This section has benefited enormously from access to an unpublished report from the Agricultural and Food Engineering Technology Service (AGST) of the UN Food and Agriculture Organisation. We are grateful to Mr Lawrence Clarke and Ms Clare Bishop-Sambrook for allowing us access to this material at this stage prior to its finalisation.

proportion of the crop to meet cash requirements for health and education, even when prices are not favourable. Access to small pockets of irrigated land for dry season cultivation is a crucial survival strategy. The only hoe cultivators who describe themselves as food secure in normal years are found in the root-cereal farming systems of Ghana. (unpublished FAO Report June 2003).

This suggests that in "normal" conditions when HIV/AIDS is **not** reported as a particularly serious issue (although it may well have been in some of the communities studied), it is very rare indeed for farmers unassisted by some additional power source to be food secure. If this is so, then poor health, excess death and lack of farm power will increase the probabilities of food insecurity. **How to supplement farm power in circumstances of asset and income poverty plus HIV/AIDS induced labour shortage is very problematic.**

Livestock

In areas where livestock do not traditionally play a key role in rural livelihoods there is growing emphasis on their introduction. Their presence improves household nutrition, offer an income opportunity, and they are a source of fertilizer for fields or home-gardens. Two very different ways of potentially saving labour and/or improving food security using small livestock are described in the literature:

1. Zero grazing.

This system involves keeping a limited number of dairy cattle or goats in fenced shelters or 'kraals' while fodder such as elephant grass (*Pennisetum purpureum*), is collected daily on a 'cut and carry' basis[58] [59]. The potential benefits of zero grazing are that it give households access to milk, meat, manure and other animal products. It is also appropriate for imported 'exotic' breeds of cattle or goats that are less resistant to disease and heat stress than indigenous varieties.

[58] Betts, A. (194) *Improving Management for Cows for Dairying by Zero Grazing. VSO Working Papers in Development* London: VSO)

[59] Sundstøl, F. (2002). Why hasn't haymaking taken off in Africa? In *"Responding to the Increasing Global Demand For Animal Products"*, Universidad Autonoma de

However, although zero grazing eradicates the need to herd animals and enables manure to be collected easily for use as fertilizer its adoption is not cost free. Access to water is essential as is sufficient **labour** and timber to construct fencing and shelters. Collecting fodder is very **labour and time** intensive. This intensity may be exacerbated by having to collect and bale additional grass for dry season fodder. In areas where it is women's responsibility to gather fodder this can significantly increase their workload[60]. While a number of projects report that zero grazing can result in a wide range of nutritional, environmental and social benefits - particularly when ownership of livestock by women is encouraged[61] - the need for labour, fodder, water, shelter, food concentrates etc. is likely to limit the number of households able to participate in zero-grazing schemes[62].

Small livestock

Small livestock such as goats, chickens etc have been seen as an important way to improve household nutrition and provide opportunities for income generation[63] [64] [65], particularly for women and children. These small stock cost less than large animals[66] as well as being faster to mature and breed which enables more rapid recovery of start-up costs and quicker income generation. They do incur costs though, associated with building shelters, herding, feeding, disease prevention and ensuring access to water[67] . Although vaccinating chickens and

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Yucatan, Merida, Mexico 12-15 November 2002

[60] Niamir-Fuller, M. (1994) *Women Livestock Managers in the Third World: Focus on Technical Issues Related to Gender Roles in Livestock Production. Staff Working Paper 18* (Rome: IFAD)

[61] SAFE (1998) *SAFE-World Project/Initiative Summary: Uganda* (Arkansas: HPI)

[62] East and Southern Africa Division Programme Management Department (2001) *Strategy Paper on HIV/AIDS for East and Southern Africa* (Rome: IFAD)

[63] Munyombwe, T., Pfukeynyi, D., Ushewokunze-Obatolu, U. (1999) 'HIV/AIDS in Livestock Production in the Smallholder Sector of Zimbabwe' in G. Mutangadura, H. Jackson, D. Mukurazita (eds) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)

[64] White, J. (2002) *Facing the Challenge: NGO Experiences of Mitigating the Impacts of HIV/AIDS in Sub-Saharan Africa* (London: NRI, University of Greenwich)

[65] Phiri and Webb, 2002, 20-21

[66] IFAD (2001) *IFAD Rural Poverty Report 201: The Challenge of Ending Rural Poverty* (Rome: IFAD)

[67] Munyombwe, T., Pfukeynyi, D., Ushewokunze-Obatolu, U. (1999) 'HIV/AIDS in Livestock Production in the Smallholder Sector of Zimbabwe' in G. Mutangadura, H. Jackson, D. Mukurazita (eds) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)

improved shelters for goats and chickens[68] increase survival this is costly in terms of **time and labour** and may be beyond the means of the most affected households.

Irrigation

Lack of easily accessible water creates major labour demands in terms of transportation for both domestic and agricultural use. Irrigation systems may be labour saving in terms of physical input but they are also associated with relatively high costs of contruction and maintenance, and with an increased requirement for management skills and, of course, time[69]. We did not make a detailed review of this technology because irrigation systems are unlikely to a major labour saving response in areas experiencing severe impact of HIV/AIDS[70]. However, the UN FAO has produced a very good overview of irrigation systems in sub-Saharan Africa[71] to which reference can be made. However it may be that rainwater harvesting is a more appropriate technology for severely impacted households[72].

Seeds/crops

Replacing cash- or food-crops with high labour requirements by starchy root crops is a widely reported survival strategy in the face of labour and time constraints. Similarly, there are reports that some improved bean varieties give increased yields without increasing timeliness or management requirements[73]. This may well be an area where there would be fairly rapid benefits from investment in new varieties, as the returns would occur within one season. However, an important question (which remains to be investigated) is whether any seed or crop change that is truly labour

[68] Topouzis, D., and du Guerny, J. (1999) *Sustainable Agricultural/Rural Development and Vulnerability to the AIDS Epidemic* (Geneva: UNAIDS)
[69] IFAD (2001) *Rural Poverty Report 2001: The Challenge of Ending Rural Poverty* (Oxford: Oxford University Press)
[70] There has been one detailed field study of the effects of HIV/AIDS on a small scale irrigation system in Thailand, see: Thangpet, 2001 and Barnett and Whiteside, 2002 p. 231.
[71] IPTRID (2001) *Smallholder Irrigation Technology: Prospects for Sub-Saharan Africa* (Rome: FAO)
[72] FAO and NARO (2002) *Study in Support of Transfer, Adoption and Dissemination of Labour Saving Technologies in Masaka and Wakiso Districts of Uganda* (Rome: FAO)
[73] Shah, M.K., Osborne, N., Mbilize, T., Vilili, G. (2002) *Impact of HIV/AIDS on Agricultural Productivity and Rural Livelihoods in the Central Region of Malawi* (Malawi: CARE)

economising (in the sense that it does not demand additional fertiliser, irrigation or harvest labour input) will have a sufficiently large yield increase to make a difference. Here the question of genetic modification has to be considered (Pinstrup-Andersen and Ebbe Schiøler, 2001). It is beyond the parameters of this paper to survey this complex area[74] other than to underline that in this context the question of adoption of GMOs does not differ from that of any other crop innovation. ***The fundamental question remains: what is the relation between the assumed period for adoption + the assumed increase in yield divided by the mean period from infection to illness?***

Initiating Change

Farmer field schools have been recommended as a way of enabling the constraints of smallholder farmers to be incorporated into agricultural research priorities[75] while facilitating the introduction of labour saving technologies or practices for farming systems and households experiencing shortages of labour[76]. Although farmer field schools have been used as a way of increasing the skills, knowledge, social links and marketing potential of farmers, different projects have met with varying levels of success[77] [78] [79]. Many farmer field schools were originally attended by male farmers but more recent attempts have been made to include female and child participants and to train women as extension workers[80]. These women-focused farmer field schools have tended to emphasise:

- Achievement of indigenous knowledge
- Learning new agricultural techniques
- Improving access to resources

[74] The current official view of the UK Government is available at http://www.gmsciencedebate.org.uk/report>

[75] Mutangadura, G., Jackson, H., Mukurazita, D. (1999) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)
[76] FAO (2002) *Measuring Impacts of HIV/AID on Rural Livelihoods and Food Security* (Rome: FAO)
[77] White, J. (2002) *Facing the Challenge: NGO Experiences of Mitigating the Impacts of HIV/AIDS in Sub-Saharan Africa* (London: NRI, University of Greenwich)
[78] Okoth, J., Khisa, G., Thomas, J. (2002) 'Towards a Holistic Farmer Field School Approach for East Africa' *LEISA* 18(3):18-19
[79] Topouzis, D., and du Guerny, J. (1999) *Sustainable Agricultural/Rural Development and Vulnerability to the AIDS Epidemic* (Geneva: UNAIDS)
[80] Okoth, J., Khisa, G., Thomas, J. (2002) 'Towards a Holistic Farmer Field School Approach for East Africa' *LEISA* 18(3):18-19

- Reducing labour required for domestic tasks to enable greater time for agricultural production[81] [82] [83] [84] [85].

Consequent upon growing recognition and pressure from governments and NGOs, increased emphasis is being given by agencies and governments to the needs of orphans, their rights and their access to and knowledge of agricultural production methods[86] [87]. For the present there are few examples of such projects but the numbers are increasing and these approaches are being incorporated into existing farmer field schools as a way of transferring indigenous farming knowledge[88] and technological requirements for agricultural production[89]. Varying levels of success in efforts to include orphans and women in agricultural projects have been reported and a small number of projects appear to be offering some sustainable opportunities for agricultural production[90] [91] [92].

In the next section, we consider the empirical evidence for adoption/innovation/development of labour economising technologies in some of the countries currently affected by the HIV/AIDS epidemic.

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[81] White, J. (2002) *Facing the Challenge: NGO Experiences of Mitigating the Impacts of HIV/AIDS in Sub-Saharan Africa* (London: NRI, University of Greenwich)
[82] Okoth, J., Khisa, G., Thomas, J. (2002) 'Towards a Holistic Farmer Field School Approach for East Africa' *LEISA* 18(3):18-19
[83] IFAD (1998) *Agricultural Implements Used by Women Farmers in Africa* (Rome: IFAD)
[84] Gari, A., J. (2002) *Agrobiodiversity, Food Security and HIV/AIDS Mitigation in Sub-Saharan Africa: Strategic Issues for Agricultural Policy and Programme Responses* (Rome: FAO)
[85] IFAD and FAO (2002) *Labour Saving Technologies and Practices for Farming and Household Activities Under Conditions of Labour Stress* (Rome: FAO)
[86] Phiri, R. and Webb, D., (2002) 'The Impact of HIV/AIDS on Orphans and Programmes and Policy Responses' in Cornia C.A. (ed) *AIDS, Public Policy and Child Wellbeing***,** Florence, UNICEF
[87] Mutangadura, H. Jackson, D. Mukurazita (eds) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)
[88] Okoth, J., Khisa, G., Thomas, J. (2002) 'Towards a Holistic Farmer Field School Approach for East Africa' *LEISA* 18(3):18-19
[89] Gandiya, F. (1999) 'some Technological Requirements for Resource-Deprived Households in the Smallholder Farming Sector' in Mutangadura, H. Jackson, D. Mukurazita (eds) *AIDS and African Smallholder Agriculture* (Zimbabwe: SAfAIDS)
[90] Gari, A., J. (2002) *Agrobiodiversity, Food Security and HIV/AIDS Mitigation in Sub-Saharan Africa: Strategic Issues for Agricultural Policy and Programme Responses* (Rome: FAO)
[91] White, J. (2002) *Facing the Challenge: NGO Experiences of Mitigating the Impacts of HIV/AIDS in Sub-Saharan Africa* (London: NRI, University of Greenwich)
Phiri, R. and Webb, D., (2002) 'The Impact of HIV/AIDS on Orphans and Programmes and Policy Responses' in Cornia C.A. (ed) *AIDS, Public Policy and Child Wellbeing, Florence,* (UNICEF)

Evidence for innovation and adoption of labour saving responses in Africa

Is there any evidence that individuals, households and communities are adopting labour economising technologies as a response to the HIV/AIDS epidemic? To answer this question we undertook visits to four African countries plus additional interviews in Nigeria and Mocambique[93].

Methods

Four countries: Uganda, Tanzania, Malawi and Zambia, were chosen on the basis of known high impact levels of HIV/AIDS and accessibility. Between four and six working days were spent in each country visiting a total of 43 organisations that identified their activities as addressing the dual problem of improving food security and reducing labour requirements for agriculture and rural livelihoods. Respondents were selected through initial contacts and searching the telephone directory in each country for academics, donors, international NGOs, and local NGOs involved in mitigating the impact of HIV/AIDS on rural livelihoods (Table 3). A number of organisations in each country identified as working in this area were not contacted due to problems with phone lines, incorrect telephone numbers or non response to phone calls. The details of these organisations are in Appendix 2.

The main research instrument was a semi structured interview[94] with representatives of each organisation working with, or supporting others involved in, labour economising technologies. Respondents included Ministry of Agriculture officials, chief executives of NGOs and other organisations, agricultural officers and extension workers. The interviews lasted between thirty minutes and two hours and are identified by the initial of the country and the interview number. Details making it possible to identify the source of each piece of information appear in Appendix 2.

[93] Rachel Grellier undertook extensive and structured fieldwork in Uganda, Tanzania, Malawi and Zambia while Tony Barnett explored the issues less formally on visits to Mocambique and Nigeria.

[94] **The interview guide appears as Appendix 1**.

Table 3 Respondents

	Uganda	Tanzania	Malawi	Zambia
Organisations identified	29	33	41	40
No. of interviews	15	11	6	11
Interviewee affiliation				
Government	2	-	-	2
Freelance consultant	1	-	-	-
Academic	3	1	-	-
Donor	2	5	1	2
NGO	7	5	5	7
Main focus of project activity				
Technical and financial assistance	3	5	1	2
Livestock*	5	1	1	3
Training in non-agricultural skills	2	-	1	-
Field based agriculture	3	4	2	5
Income generating activities**	2	4	2	1
Micro credit	2	1	-	-
Irrigation	1	-	1	3
Conservation agriculture	-	-	3	4
HIV prevention	3	5	-	2

* Includes small livestock for income generation, draught animal power and zero grazing.

** Excluding small livestock

Classification of project activities is difficult because many were involved in multiple activities serving a wide range of purposes. For example small livestock and field-based agricultural activities provided food for household consumption, income from sale of surplus produce, required participation in training schemes and involvement in micro-credit schemes with which to repay the provision of inputs such as treadle pumps or livestock. Where direct repayments were not required they were replaced by compulsory 'gifts' of female offspring of animals to other households within the community (U8, U10, U15, M5, T11, Z4, Z5, Z11).

We have noted that rural livelihoods are strongly gendered[95] and ignoring this would create an artificial divide between agricultural production and its context. All projects discussed gender issues, although these tended to be limited to increasing women's participation in project activities. Women were used as the entry point and were key participants in project activities. In most

cases the goal was to strengthen their economic and social position within society, increase their access to housing, land, capital and livestock. They were targeted because it was widely considered that women were more likely to invest any benefits from their activities back into their household (M2, U1, U10, Z3, Z4, Z9, Z11). With the exception of one NGO (U8) all organisations involved men in their activities because of cultural constraints limiting women's participation in certain activities; men's traditional involvement in agriculture and an increasing recognition that widowed and older men also care for orphans. There was also a concern that previous exclusion of men had led to their failure. This was considered to reflect the lesson that their exclusion may have given rise to resentment and also because exclusion was difficult because of existing cultural constraints and the damage it caused to important social networks (U1, U10, Z4, Z9). Iin Malawi one project overcame these obstacles by encouraging women to give their husbands a certain proportion of the money they earned (M2).

Limitations of the study:

Time

The limited time available for fieldwork imposed restrictions on the type of information gathered. It was originally planned that six working days could be spent in each country. This was reduced by national holidays in Zambia and Malawi.

It was also originally intended to carry out site visits and office-based interviews. A number of factors meant that this decision had to be re-considered. The wide geographical spread of projects, poor roads, difficulties in communication and other logistic difficulties meant that the number of visited in each country was severely limited. In addition, the epidemic itself intervened. Thus in Malawi fieldworkers cancelled a planned visit as all participants were attending a local funeral.

[95] For a detailed discussion of these issues, see also Seeley, Sutherland, Dey and Grellier, 2003.

For these reasons, the interviews focused on those projects with representatives based in the major urban centres of each country. That we had to compromise breadth for depth of information was disappointing. However there was also a benefit insofar as while data were not always as detailed as originally hoped there were increased opportunities to investigate whether recurring themes and issues emerged from discussions. This strategy also meant it was easier to identify generalisable patterns of implementation, uptake and sustainability of 'labour saving' activities.

Information bias

It was made clear from the outset of each meeting that its purpose was to document the experiences of projects and that no funding opportunities were linked to the research. Even so and inevitably some interviewees may have been concerned to emphasise the successes rather than the problems of their organisation's activities. We do not believe that this problem was any greater in office-based interviews than it would have been on site visits. It is more the length of visit and the interviewee's perception of its purpose that influences the information provided rather than simply the setting. Extension workers can select which participants are visited, and in the presence of NGO representatives, participants may be reluctant to discuss problems that they encounter.

Sector bias

The original aim of this part of the research was to give equal consideration to fishing, forestry, pastoralism, field-based agriculture and other related activities. However, lack of time in the field and difficulty in contacting some projects, coupled with the plethora of literature on field-based agriculture, and the relative scarcity of publications on fishing, forestry and pastoralism meant that there was little opportunity to collect data on these activities. This was disappointing as there is much to be learned about mitigation of the impact of HIV/AIDS in communities dependent on these activities as the relative absence of information and the suspected high levels of infection suggest there is a need for studies focusing specifically on mitigation of HIV/AIDS in

these communities. This is especically so because diversification of these livelihoods is difficult (U7, T5, T11).

This research did not aim to provide *a technical critique* of the most commonly encountered interventions: conservation agriculture, livestock projects, irrigation, micro credit and income generating activities. Instead we focus on key issues which impact on the activities and effectiveness of projects involved in mitigating the impact of HIV/AIDS on rural livelihoods through low-labour input agriculture and related activities.

Findings

Over the course of the interviews a number of significant issues emerged in relation to the work of projects in all geographical and sectoral areas. Projects using different technologies and in very different cultural settings were facing similar problems and dilemmas. These structural and conceptual issues are important not only in terms of the ongoing work of these projects but also for future developments which attempt to mitigate the impact of HIV/AIDS on rural livelihoods. Thus, rather than giving a critique of interventions based on country or type of activity, we focus on these areas of major importance and highlight the ways in which they affected the work of different projects.

A. 'Labour economising'

We have referred to this issue above. Here we highlight an underlying theoretical problem. Although projects described their activities within the context of reducing labour requirements these seldom represented a decrease in the **total** number of hours required to produce a food crop. More frequently interventions resulted in:

Changes in labour allocation:

i) Spreading labour more equitably over the agricultural season thus reducing the intensity of physical labour and also the time constraints. Thus, for example, digging permanent

seed basins requires a substantial time commitment but can be carried out over an extended period of time. This permits labour for land preparation to be distributed more evenly throughout the year (M6, Z1, Z2, Z3, Z8). The introduction of a new hybrid hoe/pickaxe was intended to assist this work in the dry season when hard pan soils made difficult the use of traditional hoes (Z1, M6).

ii) Substitution of labour from herding livestock to collecting fodder for penned animals in zero grazing projects increases time and effort but adds value to milk or meat production by enabling easy collection of manure to fertilise crops (M3, M5, Z7, Z9).

Changes in the social organisation of labour

Formation of formed formal and informal labour sharing groups to facilitate land preparation, weeding or harvesting may not reduce total cultivation time. But it enables a greater number of households to overcome problems of timeliness associated with land preparation, planting and harvesting. It also reduces the need to hire labour or engage in wage labour on other people's fields (M2, M3, T6, U7, U8, U11, U12, U15, Z2). Labour sharing is often reported as a return to "traditional" forms of labour. Such returns to "tradition" should be treated with a degree of scepticism while recognising that this is one way of legitimising/explaining what is happening. One project representative felt strongly that organisation of working groups was more appropriate and sustainable for very impoverished and subsistence farmers than any other intervention (U7). Broader social benefits may be gained from such working groups. One respondent described how women in particular 'get incredible strength from each other' (M2) as sharing work provided emotional support and increased social cohesion. A community employed a herdsman to care for cattle that would previously have been herded by individual members of each family. This reduced time spent taking cattle to water and also helped with disease control as it was easier to dip large numbers of cattle at the same time. Payment for these services was in the

form of calves and if increased care was needed for sick animals the household gave an additional payment of approximately 5 litres of milk (Z3).

Substitution of physical labour by other time-consuming commitments:
Some technologies, including conservation and irrigation systems reduce the amount and intensity of physical labour but require learning new skills in addition to increased levels of management and maintenance (M2, M6, T8, U12, Z1, Z2, Z3, Z6, Z8, Z9).

Reducing time spent on domestic labour:
Provision of easily accessible household water supplies, shared childcare arrangements, or provision of home care for the sick enabled women in particular to spend more time on agricultural or income generating activities without necessarily having to acquire new skills or have the ability to make financial investments (T8, T6, U15).

Replacing time spent on agricultural production with other activities:
Some projects encouraged development of non-agricultural income generating activities with young people and adults in order to provide a regular cash income with which to buy, rather than produce, food. An additional perceived benefit of training in non-agricultural skills was that although it was hoped this would encourage participants to remain in their own communities, thus strengthening social cohesion, if they chose to leave they at least had newly acquired skills with which to gain employment elsewhere. Artisanal training schemes involving both young men and women reported varying and sometimes contradictory success levels. One project reported that girls given the opportunity to obtain economically viable skills tended to do better than boys (U10). Others described how girls were more likely to leave projects and marry early (U7, U10, U15). It may be that these outcomes were influenced by household structure, and that young women were more likely to withdraw from projects if they were members of a female-headed household (U10, U11, U15). The ability to be able to actually generate income is, however, dependent on access to tools and equipment. Following successful completion of training, several organisations provided participants

with equipment. The cost of the equipment had to be repaid but in the long term this investment was considered essential if participants were to achieve a better level of economic security (M1, U1, U10, Z4, Z11).

It must be remembered, however, that each IGA is in fact a business. Business start-ups are difficult in all societies. They require investment of time and money and their success and sustainability depends heavily upon the economic, fiscal and market regime. Most of these are already unfavourable in poor countries. Such activities are also markedly affected by gender constraints.

Reducing time spent on domestic labour:

The adoption of 'labour economising' technologies may save physical energy but tends to be accompanied by the cost of developing skills or the substitution of one type of labour by another. Reducing time and energy spent on domestic labour through, for example, the provision of easily accessible household water supplies, shared childcare arrangements, or provision of home care for the sick, enables women in particular to spend more time on agricultural or income generating activities without necessarily having to make financial investments or acquire new skills (T8, T6, U15).

B. Food security

Food security may be achieved in a number of ways:

Increasing yields:

Yields may be increased by various methods, several of which are incorporated into conservation agriculture. For example, reduced tillage, mulching, use of organic or inorganic fertilizer and compost, crop rotation or high yielding varieties of seed (M6, Z1, Z2, Z3, Z8). Hybrid varieties of livestock can also improve milk or egg production in addition to the use of manure for fertilizer (M3, M5, U15, Z4, Z7, Z9).

Extending the growing season:

Irrigation projects such as treadle pumps or drip irrigation can extend the period of time over which crops can be grown (M6, T8, U3, U12, Z6, Z9).

Production of different crops or livestock:

The risks of crop loss may be reduced by selection of fast maturing varieties. These increase the number of harvests achieved during a growing season (M2, M5, T5). Similarly, adoption of crops which have low inputs and flexible time requirements e.g. beans, cowpeas, cassava, sweet potatos etc. (M2, M3,T5, T8, U7, U12, Z1, Z2). May be advantageous. Although examples were given of households utilising these crops, their introduction was not an official part of project interventions for households experiencing labour and time constraints. Instead they appear to be an informal coping strategy.

Small livestock such as goats and chickens may be easier to rear and maintain than larger animals. As well as providing meat their by-products such as milk, eggs and manure can directly or indirectly supplement household food supplies, although goats may cause environmental and crop damage (Z11, Z10).

Example:

Many households with small livestock sell breeding animals out of desperation to obtain cash in order to purchase food if they are unable to cultivate more than 1ha of land due to sickness. If they are able to keep a small number of quick breeding animals such as chickens they may be able to maintain a supply of both animals and cash. For example, an orphan was given 10 chickens by his grandmother and the following year the flock had expanded to 78. He sold some at intervals to pay school fees and other expenses ($6 in all) but also kept increasing the number of chickens he had until he was able to sell a large number to pay for work to maintain the family home. (Z3).

The project respondent noted that it was possible to introduce 100 goats into a community (10 goats each going to 10 households). At the end of the year the recipients can repay half, and the following year all can be paid back (Z3).

Improving post-harvest storage:

In some areas even if sufficient food is produced, poor post harvest storage facilities result in the loss of produce through damage by pests and vermin. Improvement in structure of grain stores and the use of natural repellents

such as *tephrosia vogelii* to reduce post harvest weevil problems can improve food security without additional interventions in food production (M6, Z3).

Increasing access to cash with which to purchase food

Economic activities including paid agricultural labour, artisanal activities, or transactional sex or commercial sex work can fully or partially replace agricultural production and enable increased food security by generating cash or other means to obtain food (M1, M4, T1, T4, T6, T8, U1, U7, U10, U11, U15, Z11). These can all be considered as "labour economising responses" although some clearly carry additional longer term risks than do others. They may be subject in addition to market or climatic fluctuation.

The Problem of Multiple Objectives

Attempts to subsume the objectives of increasing food security and reducing labour requirements into a single intervention may result in lack of clarity. There are many potential areas of tension as well as some congruence between these objectives. For example, it is difficult to cope with reductions in available labour and increasingly fragile entitlements to essential assets, while simultaneously improving food security. **Such a complex strategy requires explicit consideration of achievable goals and appropriate interventions for the cultural, ecological and socio-economic strengths and constraints of each project setting. Furthermore it demands close community participation in agenda setting.**

Early in the epidemic, it was thought possible to target interventions explicitly at either households or communities that were most seriously affected (World Bank, 1997). This reflected the dominance of a very particular economic ideology associated with the international financial institution in the 1980s and early 1990s. We now know that the situation is more complex and that need is determined by a range of structural and political factors beyond the household and/or the community. The organisations we interviewed aimed to work with highly vulnerable households, however, their level of involvement was often limited by the following factors:

1. The extent to which local communities seek support. This has negative implications for those communities without either the time and/or the capacity to seek external help.
2. The extent of past interventions in the district. Donors and NGOs tend to work in areas that have already received assistance as they contain some of the infrastructure necessary for doing development. This immediately excludes the remotest rural communities from receiving support.
3. The commitment of politicians and technocrats, and the openness of the community itself to prospective interventions.
4. Insurgency (particularly in Northern Uganda). In some areas this was viewed as having a more negative effect on development efforts than the impact of HIV/AIDS (DANIDA).' (Seeley et al, 2003)

Problems of Selection and Targeting

After a selection process to decide which districts needed HIV related interventions based on antenatal seroprevalence data, household circumstances, level of NGO coverage, and economic status as proxies for both impact of the epidemic and the level of support needed, it was decided to support all 56 districts as increased vulnerability due to HIV/AIDS is a national problem.

However, a range of external issues intervened. These included:

- the *number of people seeking support,*
- *previous NGO experiences,*
- *perceived openness of local politicians and other key individuals to interventions*

As a result the organisation is only able to work in 16 districts, focusing on 120 local groups.

Districts with good natural resources but experiencing civil unrest are beginning to see the first cases of malnutrition. There are concerns about the impact of this on HIV/AIDS affected families but insurgency is also leading to re-thinking of what interventions are most likely to be successful. Loss of homes, land and livestock are leading to increasing social dislocation and technical support for any interventions has to be provided from a distance and district teams are unable to carry out monitoring and evaluation activities. Donors are also reluctant to fund projects in these areas. They are concerned about the likelihood of failure, and staff are difficult to recruit because they fear for their safety. (U1)

Likewise projects reported that targeting at household level was also influenced by a number of factors including:

- Structure
- Vulnerability

- Assets
- Gender
- Social networks

While these household characteristics were used to indicate need for assistance, extremely high levels of poverty or social isolation often also prevented participation in project activities. HIV/AIDS has increased the number of elder-, female- and orphan-headed households in many communities. These households generally have insecure entitlements to physical assets such as housing, land and livestock. They also have reduced capacity for agricultural labour and face cultural and knowledge constraints to agricultural production. Although many projects initially described the focus of their activities as based on *vulnerability* the interviews also revealed that access to essential assets such as cash, land, labour etc. were required as a prerequisite to participation (M4, M5, M6, U3, U7, T5, Z2, Z4, Z6, Z9, Z10). The most vulnerable households are frequently those without access to essential inputs such as land, labour or capital, or insufficient emotional energy for the organisation and risk taking associated with adoption of new technologies. As a result, these households were often unable to participate in project activities. They were also sometimes excluded from group activities e.g. micro-credit schemes, by members of their own community if they were thought unlikely to be able to make continuing or sufficient contributions. This general focus on what one interviewee described as 'the active poor' (U3) was overcome by one project in Uganda. This explicitly and consciously emphasised the range of contributions often apparently 'assetless' individuals **could** make – practically validating their capabilities. For example, one agricultural group included a member who had little land to cultivate but was extremely good at negotiation. This was extremely beneficial to the group when they were purchasing seeds and selling produce to wholesalers (U11).

Evidence from this research shows very clearly that where interventions were effective this was often due to participation based on explicit inclusion and exclusion criteria such as: secure access to land, water, capital and labour in the case of zero grazing projects (M5, Z5). Equally, lack of targeting reduced

the likelihood of success, although cultural constraints were also important in the failure of projects, for example where participants were reluctant to use draught animal power for ploughing or transport (M5, Z4), or when high treadle pumps were considered inappropriate for use by women (Z6). Although successful targeting increased the likelihood of success it also often excluded the most vulnerable households who were unable to make the physical, emotional and financial investments required.

Example

Assets typically required for project participation in Uganda, Tanzania, Malawi and Zambia:

- ***Zero grazing:*** *access to grass and other fodder or land on which to grow elephant grass before the arrival of livestock; labour to cut grass; shelter and fencing for livestock; access to water.*
- ***Conservation agriculture:*** *access to land, access to labour, cash or credit for pesticides, equipment etc.*
- ***Irrigation****: access to land, access to water, access to irrigation equipment e.g. treadle pumps, drip irrigation system, time for management and maintenance*
- ***Micro-credit:*** *access to approx. $0.5 per week, access to savings groups*

Training

Projects involving the introduction of change through, for example, the development of income generating activities or changes in agricultural production methods, acknowledged the need for training to be given both before and during uptake of interventions:

Pre-implementation:

Changes in agricultural production required training in care of livestock, new land preparation techniques, management of irrigation systems and maintenance of equipment. Economic activities require training in specific skills and, particularly in the case of group activities, internal insurance systems, management and record keeping.

Range of skills:

Many interventions required training in both practical and management skills although income generating, livestock and irrigation projects appeared to require the greatest level of practical and marketing skills. Group activities required development of a wider range of skills. One successful agricultural project provides a very wide training curriculum which covers:

- reasons for coming together as a group,
- how to maintain groups,
- resource mobilisation,
- leadership qualities,
- types of leadership,
- leadership skills,
- commodity selection (including quantities, qualities, potential problems etc.),
- marketing awareness,
- effective seasonal planning
- proper use of agro-chemicals
- use of improved seeds and planting materials,
- relations with seed processors,
- marketing (including negotiation skills),
- branding etc (U11).

Agricultural skills training has traditionally been undertaken by extension services, however, a general shortage of extension workers was a common problem for many projectsIn all countries visited extension services were experiencing scarcity of workers due to high levels of HIV/AIDS. In the case of Malawi and Uganda this was exacerbated by reduced national investment in training extension workers.

Although initial training prior to implementing direct change seems essential for project success, this initial investment has costs in terms of money, time, energy and commitment. Access to these resources is unlikely to be available to households worst affected by HIV/AIDS or food shortages. Costs also occur at organisational level. One project had made a substantial financial investment in training one of their three extension workers - only to lose him shortly afterwards to another NGO (M5). Other projects also described the increasingly competitive nature of the employment market for

extension workers (M1, M3, M5, Z9, Z10). HIV/AIDS only exacerbates problems of recruitment and retention.

"The Stairway Project"

One project in Uganda, which we will here describe as the "Stairway Project", used initial training sessions to ensure inclusion of a wide range of participants from the local community. It did this by focusing on increasing understanding of the potential contributions to be made by those who had few material assets, for example land, but who had skills that enabled them to make alternative contributions. This NGO placed emphasis on using the training sessions to increase the likelihood of continuing project success through creation of a shared understanding of overall goals and conflict resolution strategies. Early preparatory training also allowed households to self-select out of agricultural and micro-credit projects by realising that they would not be able to meet the demands of participation (U11). However, the project ensured that there was a "staircase" of activity options which ensured continuing participation or inclusion at some level by anybody who wanted to be a member. People could progress up or down the staircase depending on their changing needs.

Markets

Projects in all countries encountered market-related problems linked either to problems of physical access or levels of supply and demand (M2, M4, M6, T1, T8, T10, T11, Z4, Z8, Z11).

Structural problems:

Isolation and poor roads increased difficulties in accessing inputs such as tools and pesticides, as well as reducing opportunities for sale of produce from income generating activities or agricultural activities. Poor roads and long distances made it difficult for individuals to transport goods to market, particularly in the case of women where they were culturally prevented from riding bicycles or using draught animals. Other projects were unable to market produce during the rainy season, when roads were temporarily impassable (T1, T11).

Poor access and distance from markets also limited diversification strategies such as non-agricultural employment. It also weakened opportunities for linkages between projects and wholesalers such as seed merchants or milk companies by preventing them from visiting communities to sell seeds or set up milk collection points (M2, T8, Z7). Even so, three dairy projects had managed to negotiate with a dairy company to collect milk on a regular basis (M5, T8, Z4). Another two projects were attempting to overcome these problems by using project staff to act as intermediaries on behalf of local participants (U11, Z7).

One project had utilised its relative inaccessibility from local markets to develop retail or wholesale projects *within* communities. This was based on the purchase of agricultural equipment, fertilizer, pesticides, tools etc., which were then re-sold for a profit within the local community, although still at lower prices than individuals could have obtained at regional markets. Apparently this led to increased food production, reduced time costs in both accessing markets and agricultural activities, and increased access to cash for households running the project (U2)

One income-generating project producing handicrafts in Uganda was unable to rent premises in parts of town popular with tourists due to high rents and this was severely restricting sale of their products (U8).

Supply and demand problems:

Projects that aimed to increase food security by enabling households to obtain cash through sale of surplus agricultural produce found that rain-fed agriculture and a tendency towards monocropping led to wide fluctuations in prices which limited the benefits to participants. Immediately after harvest - when supply was plentiful - prices were very low. Later in the season food shortages led to much higher prices, but poor storage facilities made it difficult for farmers to use these market fluctuations to their advantage or to sustain more equitable distribution and greater price stability (M2, M6).

Absence of market analysis – and, indeed, of a market - is illustrated by four income-generating projects in three different countries. Each of which had assumed a market existed for honey production - only to find that it did not (M2, T10, Z3, Z4).

Market liberalisation was considered by several projects to have weakened market structures, exacerbated inequalities of power between small-scale producers and wholesalers (M2, Z3, Z11), and brought increased competition from low-cost subsidised imported produce.

Seeds

A few projects recognised that a result of increasing rural poverty and food shortages is the sale of seeds to pay for medicine, transport to hospital, funerals etc. This means that people can no longer afford to keep indigenous fertile seeds for the following season and instead have to purchase them each year. Some projects try to prioritise seed distribution to affected households (U7, M2, M3). One of these projects (M2) had distributed 4kg of groundnuts to each farmer in a group of 10. The farmers each repaid 8kg and due to peer pressure rates of attrition were low. This was considered a very successful project and had been expanded through local CBOs. One group had also taken over a shop in a trading centre and had developed their own successful revolving seed fund.

Several projects in Malawi and one in Tanzania (T11) place considerable emphasis on improving post harvest storage of seeds, particularly through the development of village seed banks, to reduce damage caused by vermin and pests (M2, M4).

One organisation felt that there is a potential for distribution of fast maturing seeds as 90 day maturing maize can give 3 crops per year. Although it has a smaller cob it is much sweeter and so is in high demand for green maize. However, open pollinated varieties (OPV) were increasingly difficult to access due to monopolisation of the market place by international seed companies

producing infertile hybrid varieties (M2). This of course takes us back to the GMO issue which is discussed briefly above.

Social protection

High levels of infection in the working population result in increasingly adverse dependency ratios, changed demographic structure and increasing numbers of orphan-, female- and elder-headed households. All theseare vulnerable groups but with different areas and levels of vulnerability. The changing social structure of communities and growing numbers of destitute people means that social protection as well as technical support is becoming a major issue within rural livelihoods. This is a way of maintaining essential *social reproduction* **alongside** subsistence agriculture. The latter is, after all, merely a means to the former.

A continuing and strongly gendered limitation to interventions is individual lack of entitlement to land, housing and other means of production. Social protection can secure access to productive resources, reduce time and energy spent on social reproduction , increase social cohesion and provide social safety nets for households affected by the epidemic (M3). All of these have important implications for both mitigating the impact of HIV/AIDS and on the uptake and sustainability of labour economising technologies.

Ownership of, and access to, housing, land and other productive assets is strongly gendered, usually in favour of men and projects in all countries described the vulnerability of women and orphans who lose access to these entitlements on the death of the male head of the household. Access to land was also sometimes dependent on favourable relationships with traditional leaders rather than on legal ownership. Where people have “weaker” forms of property, investment in long-term labour saving activities like tree planting, conservation agriculture and irrigation systems are less likely to succeed (U3, Z9). Likewise, there are disincentives to spending money on livestock, or time and energy spent building fencing and shelters when they may be lost to other family members. Even so, one project found that membership of the

organisation and support provided by project staff was helping to prevent asset snatching by relatives (U11).

Respondents from two projects in Uganda suggested that rather than introducing labour saving technologies, it was better to improve people's knowledge of and access to support services as this would save substantial amounts of time for many households and improve their health and nutritional status. Furthermore, improving the awareness of appropriate services among easily accessible community members already actively providing, for example home care, could benefit a greater number of households than many interventions based on technical services and skills (U1, U8). However, it was also suggested that in many communities there would not be enough mobilisation to establish a form of referral service and that it could potentially increase stigmatisation of affected households (U7). This shows the context specific nature of such experience. Uganda already has a well-established HIV strategy; it might be more difficult to provide information on sources of support and treatment in countries such as Tanzania where HIV/AIDS policies are less integrated.

Sustainability

In a short project like this, it was difficult to assess the sustainability of interventions. Many labour saving technologies are not new but are being re-introduced in an attempt to mitigate the impact of HIV/AIDS. It is not clear whether their *previous* lack of sustainability indicates a general problem of inappropriate technology or whether under relatively stable conditions the perceived benefit was insufficient compared to the costs of introduction. *There is an implicit assumption in some policy thinking that increasing desperation may provide an additional incentive for uptake, particularly if participation results in training, assets and support*. However, this raises questions about the ethics of the length of funding provided by donors, provision of long-term technical support and the preparation of safety nets in case the intervention is unsustainable or unsuccessful (Z11). This was discussed particularly in relation to conservation agriculture (M3, Z3), and irrigation projects where

previously abandoned structures were currently being rehabilitated (T8, U12, Z6).

The increasingly disadvantaged situation of many households means that well established micro-credit schemes are changing the format of savings groups as loss of members due to HIV/AIDS related morbidity, mortality or increasing poverty threatens group cohesion (T11, U7, U8, U10, Z10). Internal insurance schemes have been introduced as a way of increasing sustainability, alongside encouraging a surviving child or spouse to take over membership (M2, U8, U10, U15). Such safeguards can only compensate for loss of a limited number of members. It is unclear if these projects will be sustainable over the long-term in areas of high HIV/AIDS mortaility and morbidity. It is also unclear whether the resulting increased costs of the 'insurance' payments (or reduced savings) will have a negative impact on savings groups.

Even if individual schemes are not sustainable, the 'culture of saving' reflected in the training and activities of some NGOs does continue beyond the life of individual projects, leading to continued savings and investment in economic activities and food security (M2, U7, U10, U11). Respondents also described the way in which other activities, if not projects, are often indirectly sustainable. For example training schemes providing financial, business, management training and all-round 'capacity building' have enabled women's and widow's groups to obtain credit from external organisations although their gender, poverty and general lack of assets would previously have prevented them from obtaining funding (U7, U10, U11, Z2).

It was hard to obtain data on sustainability of individual livestock projects although schemes to introduce chickens into communities in Uganda and Malawi have been unsuccessful due to problems in vaccinating against Newcastle disease (M5, U3) and rabbit breeding schemes have also failed (U8, Z7). There appear to be unanswered questions about the sustainability of zero grazing, particularly in areas of land scarcity where non-rotational production of elephant grass for fodder is essential (M3).

Projects introducing high yielding ‘exotic’ cattle breeds reported problems with disease prevention. However, cross breeding with indigenous varieties increased disease resistance, although several generations of cross breeding were needed to gain the dual benefits of increased production and disease resistance (U15, M5, Z4, Z7). While most projects began with importing exotic breeds that they then cross bred with indigenous varieties, one project instead began by providing participants with indigenous varieties and only later crossed in exotic breeds as a way of reducing vulnerability to disease (U11). It is not known if these two different approaches are likely to affect sustainability of the projects. Pig breeding projects reported mixed success. Three had failed (U8, Z4, Z7) while one was reported as being highly successful (U11).

We can conclude that there is a need for clearer consideration of both (a) the criteria for sustainability and (b) the costs – in the widest sense – to participants of projects that are not sustainable. At present it is not known whether conservation farming and irrigation systems will continue to achieve sufficient or increased yields over long periods of time and what the impact of failure will be on households participating in unsustainable projects. Only one project gave compensation to participants if the intervention resulted in poor yields (M6). It seems essential to know whether interventions that require a change in production methods can achieve sufficient yields under a range of sub-optimal conditions and to address the question: if they do not prove to be sustainable, are participants likely to be left worse off than before? A rush to ill considered “technical” innovations could also be an additional cost associated with the epidemic!

Example:

Two projects (Z1, Z9) were introducing a new tool to save time and labour in weeding. The 'chemical weed wipe' is a shoulder pack with a sponge at the end of a hose through which Roundup(C) is distributed. The weeds are wiped with the herbicide soaked sponge and this reduces waste and damage to crops.

The weed wipe system has reduced weeding from approximately 25 days (by hand) to approximately 11 days for 1ha of land. Two days are spent using the weed wipe which gives more accurate cover than conventional spray systems, and the other days are spent hand weeding within the rows to prevent damaging the crops by contact with the herbicide.

The weed wipe costs $17 and although Roundup used to cost $30/litre the price has now dropped to $5/litre. One litre can cover 0.25ha but it can only be bought in Lusaka. One project (Z9) is concerned about the long-term implications of potential increases in the price of Roundup, or that farmers may be encouraged to buy the weed wipe without realising that the pesticide can only be purchased in Lusaka. In these cases continuing participation in the project will not be possible and farmers may be left e financially worse off than they were before.

Organisation of funding

Funding for HIV/AIDS related projects has become a priority for many donor agencies. Paradoxically their structure of funding may be limiting the effectiveness, continuity and assessment of sustainability of interventions.

Timing:

The majority of interventions were assured funding for no more than three years. This makes it difficult to assess either the long-term appropriateness of the project or its impact and sustainability. This is particularly so with the new challenges that a mature HIV/AIDS epidemic is bringing to even established interventions. Most projects involve initial training, purchase of inputs and, later, the development and implementation of exit strategies. All this leaves limited time for implementation let alone assessment of the suitability and impact of interventions such as conservation agriculture and irrigation systems. Household willingness to participate is **not** necessarily an indication of long-term success. This is especially so when interventions are actively promoted. In fact support may be required over a number of years if major changes to farming systems are to succeed and yields need to be measured

over substantial periods of time under a range of climatic and social conditions (M3, M6, Z1, Z10).

In addition to preventing assessment of long-term sustainability, the short-termism of funding results in NGOs spending time preparing new proposals for funding rather than consolidating or expanding their established work. Loss of time spent searching for new funds is exacerbated by lack of recognition by donors of some projects' inexperience in proposal writing – and in some cases their lack of access to important facilities such as email or even a reliable postal services (Z11). Very wisely – and this may be an indicator of sustainability - two projects were preparing "exit strategies" to increase the likelihood of continued group activities if funding was not renewed (U10, U15).

Fragmentation:

Although one organisation in Uganda had an explicit role to work at both district government and individual project level to 'to strengthen district capacity, quality, accessible, affordable services' (U1), the competitive nature of funding coupled with infrastructure and communication difficulties meant that many organisations were working in isolation and competing against each other for limited resources. In Tanzania the creation of TACAIDS may help to overcome this problem (T3) *but at a broader level the structure of funding may be creating a barrier to cohesive development of interventions tackling different levels of vulnerability within communities.*

It is now necessary to consider some reorganisation of the structure of funding. The goal must be to facilitate increased co-operation and communication between organisations, and exploration of the impact on participants of projects that are not sustainable. At present it is not known whether, for example, zero grazing or conservation farming will be sustainable under the pressures arising from the epidemic. If they are not, what are the potential implications for participants who have made substantial investments and changes in their systems of agricultural production in order to participate?

SECTION 4: CONCLUSION

The HIV/AIDS epidemic raises new challenges for improving food security. Responses to labour shortages have traditionally focused on the introduction of capital-intensive agriculture and increasing reliance on mechanisation. This is inappropriate in areas where gender roles are clearly defined, where many have insecure entitlements to land and other assets and the impact of HIV/AIDS is resulting in a loss of both human and capital capacity. Particularly in areas experiencing a mature epidemic the new challenge is to find ways of increasing food security when faced with the simultaneous loss of both physical and social means of production. Technology already impacts on domestic and productive labour and may have the potential to reduce labour requirements particularly in terms of time or energy. Much of the technical literature fails to address the unique impact of HIV/AIDS on agricultural production. This results in a lack of synthesis between the technical and social aspects of agricultural production and rural livelihoods.

Those households worst affected by the HIV/AIDS epidemic are experiencing loss of labour, land, capital and other assets. This limits their capacity to adopt new technologies and points once again *to the need for a combination of relief and development activities by organisations working to increase food security and rural livelihoods*[96] [97]. Development and consolidation of new and existing social and economic safety nets in the form of social protection through support groups, labour sharing arrangements etc. are likely to help highly vulnerable households reduce time and labour constraints while strengthening social cohesion at a wider level. Alongside increased social protection, greater flexibility of technical packages and farmer participation in their utilisation and adaptation[98] [99] is necessary. If successful, this might

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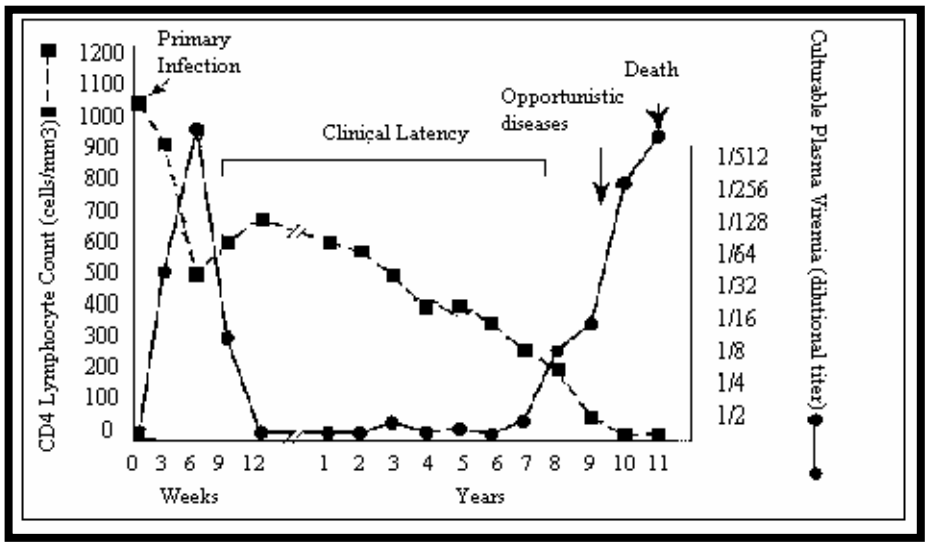
IASC (2002) *HIV/AIDS and Food Security in Southern Africa* (New York: IASC)
FAO (2002) *Measuring Impacts of HIV/AID on Rural Livelihoods and Food Security* (Rome: FAO)
Okali, C., Sumberg, J.E., Reddy, K.C. (1994) 'Unpacking a Technical Package: Flexible Messages for Dynamic Situations' *Experimental Agriculture* 30:299-310
Sumberg, J., Okali, C., Reece, D. (2002) *Agricultural Research in the Face of Diversity, Local Knowledge and the Participation Imperative: Theoretical Considerations* Agricultural Systems 76:739-753

enable as wide a range of households as possible to participate and adapt possibly labour-saving technologies to their individual and changing requirements.



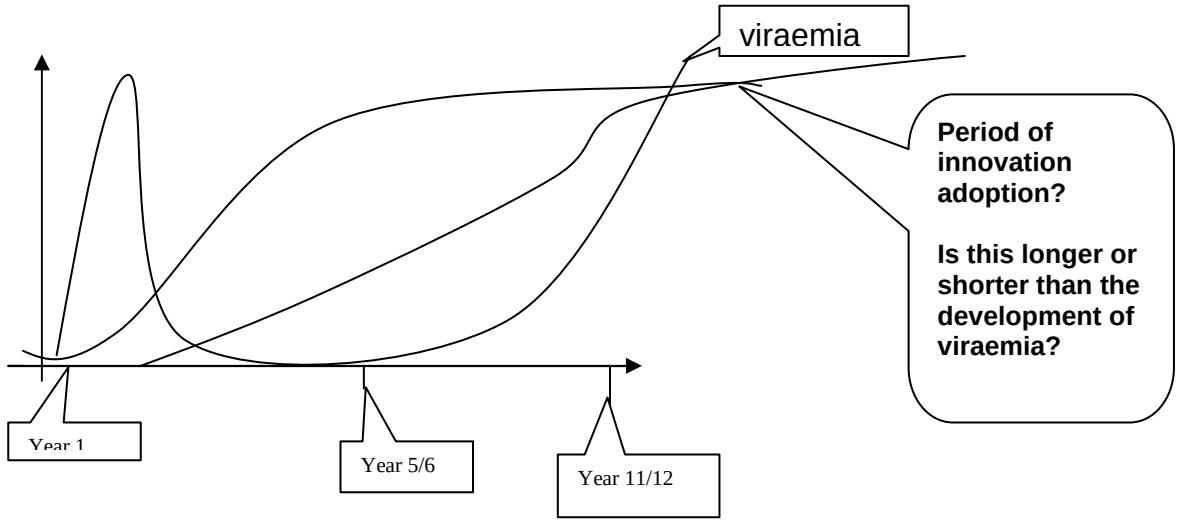


Figure 8 Viraemia and Adoption of Innovation at the *individual level*: the top graph shows progress of viraemia over the course of illness, the lower graph shows this in relation to possible rate of adoption of a technical innovation.

However, none of these are solutions to the problem of labour loss and its sequelae. They remain problematic interventions inasmuch as we do not adequately understand the processes of effective innovation and there is a disjunction between the probable time period necessary for innovation and the progress of the disease. This is illustrated *for an individual* in **Figure 8**.

However, we must recognise that in reality the problem *at the aggregate level* is much more complex. If we take as an example a society with a seroprevalence level between 10 and 20 per cent of the mature adult population, then we are confronted simultaneously with:

1) altered social and economic resilience as represented by changed demography (**Figure 3** and **Figure 4**)

2) altered potential labour effectiveness insofar as a proportion of adults are sick and therefore performing below whatever is "normal" in that society (and remember that in the Nigerian case, around a third of the population may have low body mass index and a large proportion of children are stunted and/or wasted)

3) labour diversion to care for the sick and mourn for the dying

4) likely assumed time period of any proposed innovation – which has to include the time for recruitment of appropriate trainers and change agents.

This interaction is shown in **Figure 9.**

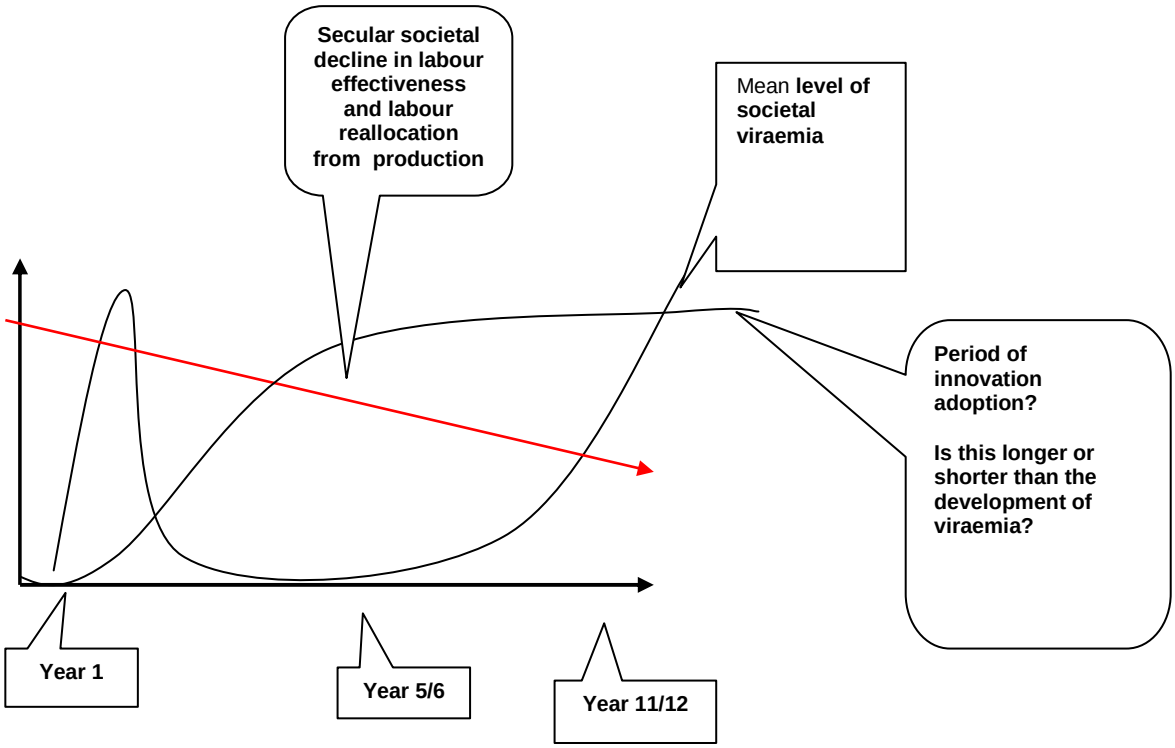


Figure 9 Adoption, Disease Progress and Effective Labour Availability

The conclusion must be that any strategies based on labour saving innovations alone can be of only limited usefulness. If this is so, what are the options?

What are the Policy Options?
The options are very limited.

- HIV/AIDS prevention interventions are extremely difficult and take a long time with very mixed results as evidenced by the explosion of infection in Africa. There is absolutely no reason to sure that prevention programmes will enable many areas with elevated seroprevalence levels to avoid the impact of the epidemic.
- Provision of relief to some areas may be necessary in the short term but such relief activities will have to take account of the following: (a) the recovery process will be longer than expected and may extend to ten years or more (b) food supply and recovery planning will take place in circumstances of changed demography.
- The sole policy intervention that can strengthen resilience and therefore recovery capacity and thus have an immediate and long term effect on food security is provision of anti-retroviral drugs. Establishment of a system to provide these drugs will also enable enhanced engagement with the TB and malaria problems. Above all, ARV treatment will ensure continuing availability of labour in the rural sector, continued care of children and most important that communities can reproduce themselves socially, economically and nutritionally. This is the path that leads to development and independence rather than dependence and destitution.

The Options

The possible options for actions are clear and as follows:

1) Do nothing
2) expand social protection
3) Expand social protection with the “stairway” approach described above
4) Introduce labour economising technologies
5) Introduce labour economising technologies with “stairway” approach
6) Introduce labour economising technologies with social protection and “stairway” approach
7) Introduce ARVs
8) Introduction of ARVs with social protection
9) Introduce labour economising technologies with ARVs
10) Introduce labour economising technologies with ARVs and “stairway” approach

11) Introduce ARVs with social protection and labour economising technologies and "stairway" approach

We shall consider these possibilities.

1) **Do nothing:** If nothing is done there will not be a cataclysm. Insofar as most of the infections in high labour dependent farming systems are in Africa, few outside that continent will take alarm at the progressive deterioration of rural livelihoods in the face of HIV/AIDS. Recurrent food shortages, insecurity and more frequent and long term famines will merely attract more emergency appeals and crisis intervention. The longer-term costs of such neglect by rich countries cannot be known but they can be envisaged and could be substantial.
2) **Expand social protection:** This will be a short term relief activity which, while necessary, will have limited long term consequences and do little to mitigate the long term effects of labour loss. This course of action would require ever increasing budgets to assist the steadily growing numbers of rural destitute and rural refugees who had fled to towns seeking assistance. This would be unsustainable and would result in a similar situation to 1 – but delayed by a few years.
3) **Expand social protection with the "stairway" approach:** This would buy some time but not mitigate the long-term problems. It would not build for the future.
4) **Introduce labour economising technologies:** This might work in the long term but we do not know whether and where it works, nor do we have a shelf full of known technologies which are appropriate for these circumstances. There may be some patchy successes but there will not be a generally useful and effective intervention that safeguards food security. The rate of growth of the rural destitute will be marginally reduced. This approach will however only ensure that more "projects" are developed.
5) **Introduce labour economising technologies with "stairway" approach:** This would have the same limitations as 4 but would have the additional advantage of perhaps limiting social exclusion and destitution.
6) **Introduce labour economising technologies with social protection and "stairway" approach**: This remains limited but extends beneficial effects into a medium term.
7) **Introduce ARVs:** the logistic and cost challenges of any strategy that includes ARVs are considerable. However, the question of "cost" has to be rethought. Prices of ARVs are falling and recognition of the constituents (particularly the hedonic constituents) of "cost" (and therefore benefit when the cost is avoided) is expanding (Moatti et al, 2003). We are also beginning to see results that show that ARVs can be used in resource poor settings. If we are to speak of "labour economising" we should recognise the possibility that ARVs do truly economise on labour as they are literally labour **saving**. In saving lives they enable people to be economically and socially productive, to care for children, to participate in the lives of their communities and to govern themselves effectively. For these reasons, it could be argued that to introduce any labour economising technology without saving the labour through provision of care is an

extraordinary mis-use of resources. An ARV strategy is not a solution: it is merely a window before viral resistance gets out of hand. However, that window is longer and more certain than any other window currently available. ARVs could also be an important part of a new type of prevention programme which goes beyond the rhetoric of moral discourse to a realistic assessment of personal risk through voluntary counselling and testing (VCT) and a reason to change behaviour. The ARV route also has the advantage of bringing investment to the health sector in general and developing vertical structures for delivery of other health benefits.

8) **Introduction of ARVs with social protection**: This strategy is probably as effective as 4, 5 and 6 inasmuch as we do not know how or whether many labour saving technologies work and in what time frame. In contrast treatments do work and do save and social protection measures through transfers to households (particularly to women but also to men) have the advantage of leading to market driven solutions of the technology **and** the care problems simultaneously – or of other solutions decided by recipients. This is one of the major advantages of the fungibility of such schemes.
9) **Introduce labour economising technologies with ARVs:** Gives labour economising technologies a chance to work; in the absence of ARVs their impacts where possible will be limited by the difficulties of adoption discussed in this report.
10) **Introduce labour economising technologies with ARVs and "stairway" approach:** Has the advantages of 7, 8 and 9 with addition of an inclusive approach which maintains social cohesion and builds for the future.
11) **Introduce ARVs with social protection and labour economising technologies and "stairway" approach:** The deluxe option which literally saves labour, gives the labour economising technologies a chance to be developed and adopted while providing people with market led possibilities through social protection and social inclusion via the stairway approach.

Answers to some important questions

We began this report by posing the following questions:

1. What is the evidence that HIV/AIDS has had an impact on rural livelihoods?
2. If there is an impact and what form does it take?
3. What indigenous responses are apparent in HIV/AIDS affected rural communities?
4. If "new" or "appropriate" labour economising technologies are available how probable is it that such innovations might be adopted by people in HIV/AIDS impacted communities?

We now provide brief and summary answers to them as follows:

1) **What is the evidence that HIV/AIDS has had an impact on rural livelihoods?** There can be little doubt about the impact of HIV/AIDS on rural livelihoods in central, east and southern Africa. Impact in West Africa is just becoming evident. We need to know more about the situation in

dryland areas and in regions beyond Africa. We know little about rural impact in India, western China and the colder regions of Central Asia and Russia.

2) **If there is an impact and what form does it take?** The normal response has been to downshift the rural economy to a survival mode. While this is possible for all, the effects on the poor and very poor are to make them destitute. Recovery potential is limited and may mean that this process is a one way street.

3) **What indigenous responses are apparent in HIV/AIDS affected rural communities?** Most responses involve downshifting or reallocation at the Labour Allocation Interface. At the household level this is more easily done by the richer than by the poorer and the poorest. Among the poor (whose numbers increase) there is a move to responses which include employment or self-employment, sometimes in activities that increase individual and household risk. There is very limited evidence of responses which have anything other than short term effects.

4) **If "new" or "appropriate" labour economising technologies are available how probable is it that such innovations might be adopted by people in HIV/AIDS impacted communities?** Most indigenous responses are for short to medium term survival rather than long term development. We do not know what, how and when to introduce by way of LETs. The key problem is that the period of innovation and adoption is likely to be overtaken by the pace of the epidemic. The only truly labour economising technology is provision of ARVs.

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APPENDIX 1

MITIGATION OF THE IMPACT OF HIV/AIDS ON RURAL LIVELIHOODS, THROUGH LOW-LABOUR INPUT AGRICULTURE AND RELATED ACTIVITIES

INTERVIEW GUIDE

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1. Name of Respondent
2. Project name or other institutional affiliation

3. Country, province

4. Postal and email address, phone and fax number and if appropriate web site

5. Name of project manager/other key contact person

6. Title of project

7. Goal of project

8. Project activities

9. What was the process that brought the project into existence?

10. What are the gender aspects of the project?

11. How is the project funded?

12. What evidence is there that the particular “technology” is a response to HIV/AIDS?

13. How has the AIDS epidemic affected local agricultural and livelihood practices?

14. Are there are any “technologies” (in the broadest sense) that might be of use to people affected by HIV/AIDS as individuals or to households and communities affected by the impact of HIV/AIDS?

15. Do you think that these technologies are sustainable?

16. Do you know of any attempts that have been made to ensure that agricultural knowledge/experience/techniques is/are recorded and transmitted from generation to generation?

APPENDIX 2: ORGANISATIONS AND CONTACT DETAILS

Organisation	Code	Name	Position	Address	Email/Telephone
MALAWI					
ATTIGA	M1	Peter Phiri	Project Manager	PO Box 30383, Lilongwe 3	Mobile 09 948807 Tel. 01 754044 Email: not yet
CARE (Malawi)	M2	Nick Osborne	Country Director	3rd Floor ARWA House, City Centre P/Bag A89, Lilongwe	Tel. 265-1-774637/738 Nick@care.malawi.net Nick@caremalawi.org
DFID (Malawi)	M3	Dr. Harry Potter	Livelihoods Adviser	British High Commission PO Box 30042, Lilongwe 3 Mal	Tel. 265-01-772 400/683/123 Mobile: 265-08-821817 h-potter@dfid.gov.uk
Proscarp (Promotion of Soil Conservation and Rural Production) MASDAR International Consultants Masdar House No 1 Reading Rd, Eversley Hants RG27 0RP	M4	John Doughty	Management and Information Systems Advisor	Lilongwe, Malawi	Tel. 265 1 752722/750890 +44 118 9730750 masdarmis@malawi.net info@masdar.com www.masdar.com
Proscarp (Promotion of Soil Conservation and Rural Production)	M4	Ibrahim Phiri	Macadamia Development Expert and Team Leader	Lilongwe	Tel. 265 1 752722/750890
SSLPP (Small Scale Livestock Promotion Programme)	M5	C. Sute Mwakasungula	Executive Chairman	Murry Road, Tithokoze House Plot No. 4/234 PO Box 30200 Lilongwe 3	Tel. 265-756529 Fax 265 756529 Sslpp@sdnp.org.mw
TLC (Total Landcare)	M6	Trent Bunderson	Regional Director	PO Box 2440, Lilongwe Office: Top Floor, New Building Society Complex Old Town, Lilongwe	Tel. 265 1 757090/092 Mobile 265 8 838072 tlc@malawi.net

TLC (Total Landcare)	M6	Zwide Jere	Malawi Director	PO Box 2440, Lilongwe **Office: Top Floor, New Building Society Complex** Old Town, Lilongwe	Mobile 265 8 822420 sdi@malawi.net
TANZANIA					
Africa Alive	T1	Gregory Kamugisha		SLP 41863, Dar es Salaam	Tel. 2462434 Fax. 2462438 Aatanzan@udsm.ac.tz Gregorykamugisha@yahoo.com
CIDA	T2	Dr. Mathew Mahewa	Development Officer	Canadian High Commission 38 Mirambo Street/Garden Avenue PO Box 1022 Dar es Salaam	Tel. +255-222-2112831 Fax +255-22-2116897 Mobile +255744-361923 mahewa.mathew@dfait-maeci.gc.ca
IDS	T3	Prof Cosmas Kagushima		Institute of Development Studies University of Dar es Salaam (RG has details on email)	
ILO (International Labour Organisation)	T4	Anthony Rutabanzibwa	Programme Officer	Area office for Tanzania, Kenya,Uganda and Somalia Plot No. 2410/5 Sea View Road Mail Box 9212 Dar es Salaam	Direct line: +255-22-2126821 Mobile +255 (0)741-337097 Email: rutabanzibwa@ilodar.or.tz Rutabanzibwa@ilo.org
ILO (International Labour Organisation)	T4	Anoushka ??? ????? (KS has details)		Area office for Tanzania, Kenya,Uganda and Somalia Plot No. 2410/5 Sea View Road Mail Box 9212 Dar es Salaam	

UNAIDS	T5	Henry A. Meena	National Programme Officer	PO Box 9182, Matasalamat Mansion, Samora Avenue/Zanaki Street Dar es Salaam	Tel. 255-22-2130350 Mobile. 255-0741333148 Office: henry.meena@undp.org Private: henry60meena@yahoo.com
UNDP	T6	Dr. Elly Felix Ndyetabura	National Programme Specialist HIV & Development Programme	Matasalamat Mansion Zanaki Street/Samora Avenue, PO Box 9182, Dar es Salaam	Tel. +255-22-2112799-806 Dir. Tel. +255-22-2118072 Mobile +255-744-772982 Dr.elly.ndyetabura@undp.org
UNDP	T6	Mary Kabatange	Team Leader, Assistant Resident Representative, Poverty, Environment & Gender Unit	Matasalamat Mansion Zanaki Street/Samora Avenue, PO Box 9182, Dar es Salaam	Tel. +255-22-2112799-806 Dir. Tel. +255-22-2118074 Mobile +255-741-461259 Mary.kabatange@undp.org
USAID	T7	Vicky Chuwa		American Embassy 686 Old Bagamoyo Road, Msasani PO Box 9130 Dar es Salaam	Tel. 0744-282-973 vchuwa@usaid.gov
USAID	T8	Onesmo N. Shuma	Project Management Specialist - Private Sector	American Embassy 686 Old Bagamoyo Road, Msasani PO Box 9130 Dar es Salaam	Tel. 255-22-2668489/90 Mobile 0744 279 604 Oshuma@usaid.gov
USAID	T9	Daniel Moore	Team Leader/Environment Program	American Embassy 66 Msasani Street PO Box 9130 Dar es Salaam	Tel. 255-22-2668490 dmoore@usaid.gov
World Food Programme	T10	Appollinary Kundi			Tel. 266-7371 (no other details available)

World Vision	T11	Richard C.V. Rugemalira	Marketing Manager	Marketing Division UMATI Building 1st floor, Samora/Zanaki Street BP Box 6399, Dar es Salaam	Tel. 255-22-2118520 0741 224279 (mobile) 0741 265666 (residential) Richard_rugemalira@wvi.org
UGANDA					
AIM (The AIDS/HIV Integrated Model District Programme)	U1	Caroline Turyatemba	Information and communication coordinator	First Floor Nakawa House, Plot 3-7 Port Bell Road, PO Box 12009, Kampala	Tel. 041-222011/19-21, 031-260657/8 Fax. 041-222035 caroline@aimuganda.org
CRC (The creative research and evaluation centre)	U2	Tom Barton	Director	PO Box 2117 Uganda, Kampala. Location - THETA Building, plot 724 Mawanda Road Kamwokya, Kampala.	Tel. 256-41-534975, 532930 Mobile. 071-842762 Fax. 256-41-530619 (day) Fax. 256-41-531677 (24hrs) tbarton@crc-ug.com crc@imul.com
DANIDA	U3	Justina Kihika Stroh	Programme Officer	Royal Danish Embassy Plot No. 3, Lumumba Avenue Postbox 11243 Kampala	Tel +256(41)256687 Fax +256(41)254979 kmtambe@kmtamb.um.dk
EPRC (Economic Policy Research Centre)	U4	Godfrey Bahiigwa PhD	Senior Rsearch Fellow	Plot 51, Pool Road, Makerere University, PO Box 7841, Kampala	Tel. 256-41-540141 Fax 256-41-541022 bahiigwa@eprc.or.ug
EPRC (Economic Policy Research Centre)	U5	Isaac Shinyekwa	Researcher	Plot 51, Pool Road, Makerere University, PO Box 7841, Kampala	Tel 077-64-0415 Shinyekwa@eprc.or.uk shinyekwaisaac@hotmail.com
ISAE	U6	Joseph Tumushabe	Lecturer	Population Studies Dept Makerere University, ISAE PO Box 7062, Kampala	Tel. 077 630481 256-41-540409 256-41-541558 Fax: 256-41-530756 jouganda@hotmail.com

NAADS Secretariat (National Agricultural Advisory Services)	U7	David Muddu Mawejje	Integrated Support to Sustainable Development and Food Security Programme (IP Coordinator)	Plot 39A Lumumba Avenue Mukwasi House, 2nd Floor, PO Box 25235, Kampala	Tel. 256-41-345065/345066/345440 Fax 256-41-347843 Mob. 077-438676 naads@utlonline.co.uk d_muddu@hotmail.com www.naads.or.ug
NACWOLA (National Community of Women Living with HIV/AIDS in Uganda)	U8	Margret Ssewankambo	Chairperson	PO Box 4485, Kampala Location: Makindye along Lukuli-Nanganda Road	Tel/Fax 256-41-510528 nacwola@infocom.co.uk
Theta (Traditional and modern health practitioners together against AIDS and other diseases)	U9	Simon Busuulwa	Information Officer	Plot 724/5 Mawanda Road Kamwokya, PO Box 21175 Kampala	Tel/fax 256-41-530619 Tel 256-41-532930 Mobile 256-77-689284 msftheta@imul.com busuulwasimon@yahoo.co.uk website on line soon)
Theta (Traditional and modern health practitioners together against AIDS and other diseases)	U9	Peter Ddamulira	Training Officer	Plot 724/5 Mawanda Road Kamwokya, PO Box 21175 Kampala	Tel/fax 256-41-530619 Tel 256-41-532930 Mobile 256-77-466241 pddamulira@hotmail.com website on line soon)
UWESO (Uganda Women's Effort to Save Orphans)	U10	Odoki Thomson	Advocacy and Extension Officer	2 Tagore Crescent, Kamwokya PO Box 8419, Kampala	Tel. 041-532394/5 Mobile. 077-593891 Fax 041-532396 uweso@imul.com
CEDO (Community Enterprises Development Organisation Ltd.)	U11	Fred Kagimu Bikande	Chairman and Training Coordinator	PO Box 246, Kyotera, Rakai District	Tel. 256-(0)481-22089 Fax 256-(0)481-22088 Cedo_ug@softhome.net

CEDO (Community Enterprises Development Organisation Ltd.)	U11	Angellina Zawedde	Commercial Enterprise Officer and Micro-Projects Manager	PO Box 246, Kyotera, Rakai District	Tel. 256-(0)481-22089 Fax 256-(0)481-22088 Cedo_ug@softhome.net
CEDO (Community Enterprises Development Organisation Ltd.)	U11	Peter Genza	Commercial Enterprise Officer and Marketing Manager	PO Box 246, Kyotera, Rakai District	Tel. 256-(0)481-22089 Fax 256-(0)481-22088 Cedo_ug@softhome.net
CEDO (Community Enterprises Development Organisation Ltd.)	U11	Rosemary Mayiga	Programme Coordinator	PO Box 246, Kyotera, Rakai District	Tel. 256-(0)481-22089 Fax 256-(0)481-22088 Cedo_ug@softhome.net
FAO	U12	Lars Jensen	Associate Professional Office, Special Programme for Food Security	Plot 79 Buganda Road, Wandegeya, Kampala POBox 521, Kampala	Tel. 256-41-349916 Fax 256-41-250579 Mobile 256-71-937880 FAO-UGA@field.fao.org www.fao.org
FAO	U12	James Okoth	Programme Assistant	Plot 79 Buganda Road, Wandegeya, Kampala POBox 521, Kampala	Tel. 256-41-349916/7, 340325 Mobile 077-422-773
Rakai Project	U13	Dr. Godfrey Kigozi	Director of Field Activities	Uganda Virus Research Institute Ministry of Health PO Box 49, Entebbe	Tel. 256-77-593267 Fax. 256-41-320276 gkigozi@infocom.co.ug
Rakai Project	U13	Robert Kakaire	Research Assistant	Uganda Virus Research Institute Ministry of Health PO Box 49, Entebbe	rkakaire@yahoo.com
Rakai Project	U14	Jennifer Wagman	Ethnographic Field Director NIMH Collaborative STD/HIV Intervention Trial	Uganda Virus Research Institute PO Box 49, Entebbe (Mailman School of Public Health, Columbia University)	Tel. 256-77-721700 Jwagman@infocom.co.ug
VAD (Voluntary Action for Development)	U15	Benedict Male	Director	Bukesa, Hoima Road, PO Box 22281, Kampala	Tel.& fax 256-41-534068 vad@utlonline.co.ug

VAD (Voluntary Action for Development)	U15	Angelica Sserulyo	Women Programmes Co-ordinator	Bukesa, Hoima Road, PO Box 22281, Kampala	Tel.& fax 256-41-534068 Mobile 256-77-446212 vad@utlonline.co.ug
VAD (Voluntary Action for Development)	U15	Isaac Wamala Sembatya	Financial Administrator	Bukesa, Hoima Road, PO Box 22281, Kampala	Tel.& fax 256-41-534068 vad@utlonline.co.ug
VAD (Voluntary Action for Development)	U15	Rose Mutumba	Social Worker	Bukesa, Hoima Road, PO Box 22281, Kampala	Tel.& fax 256-41-534068 Mobile 256-077-633740 Mutumbarose@yahoo.com vad@utlonline.co.ug
VAD (Voluntary Action for Development)	U15	Christopher Kayongo	Youth Programmes Co-ordinator	Bukesa, Hoima Road, PO Box 22281, Kampala	Tel.& fax 256-41-534068 vad@utlonline.co.ug
ZAMBIA					
CFU (Conservation Farming Unit)	Z1	Peter Aagaard	Director	Showgrounds PO Box 30395, Lusaka *Home office:* 23 Twin Palms Road, Kabulonga	Tel. 265455 paagaard@zamnet.zm
FAO	Z2	Lewis Bangwe	Assistant FAOR Programme	House No. 5, Addis Ababa Drive PO Box 30563, Ridgeway, Lusaka	Tel. +260 1 252558/252568/252277 lewis.bangwe@fao.org.zm
FASAZ (Farming Systems Association of Zambia)	Z3	Coillard Hamusimbi	Projects and Research Officer	Mount Makulu Private Bag 7, Chilanga	Tel. 260 1 278510 Mobile 260 97 787078 chamusimbi@yahoo.com fasaz@zamnet.zm
HPI Heifer Project International (Zambia)	Z4	Kwacha Chisiza	Country Director	PO Box 38237, Benakale Road, Plot 5982 Northmead, Lusaka	Tel. 260-1-293285 Mobile 095-700144 hpi@zamnet.zm www.heiferzambia.org

HPI Heifer Project International (Zambia)	Z5	Amon Phiri	Training Coordinator	PO Box 38237, Benakale Road, Plot 5982 Northmead, Lusaka	Tel. 260-1-293285 Mobile 095-700144 hpi@zamnet.zm www.heiferzambia.org
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Ministry of Lands	Z6	Mwase Phiri	Principal Irrigation Agronomist Small-Scale Irrigation Project	Mulungushi House 3rd Floor, R342, PO Box 50291, Lusaka	Tel 260-1-780745 mwasephiri@yahoo.co.uk
Ministry of Agriculture and Co-operatives	Z7	Dr. P. G. Sinyangwe	Director	Department of Veterinary and Livestock Development Mulungushi House, PO Box 50060, Ridgeway, Lusaka	Tel +260-1-250274 pgsinyangwe@maff.gov.zm
Norad Support to Farmers Association Project (Agri-business forum)	Z8	Felix Chizhuka	Project Manager	120 Kudu Road Kabulonga, PO Box 30395, Lusaka	Tel. +260 1 262936 felixc@sfap.org.zm
Norad Support to Farmers Association Project (Agri-business forum)	Z8	Rollen Mukanda	Training Coordinator	120 Kudu Road Kabulonga, PO Box 30395, Lusaka	Tel. +260 1 262936 Rollenm@sfap.org.zm
TLC (Total Landcare)	Z9	Ian Hayes	Zambia Director	Private Bag E891, Postnet No 338, Manda Hill, Lusaka	Tel. 260-1-264863 Email. Tlc@zamnet.zm
TLC (Total Landcare)	Z9	MacDonald Mlozi Banda	Field Technician, (Malawi)	N/A	N/A
TLC (Total Landcare)	Z9	Zwide Jere	Director (Malawi)	N/A	N/A
USAID	Z10	Helen Gunther	Unknown	351 Independence Avenue PO Box 32481, Lusaka	Tel 260-1-254303/6
USAID	Z10	Dann Griffiths	Economic Growth (SO1) Team Leader	351 Independence Avenue PO Box 32481, Lusaka	Tel 260-1-254303/6 ext 110 dgriffiths@usaid.gov

USAID	Z10	Chris Muyunda	Economic Growth Deputy Team leader	351 Independence Avenue PO Box 32481, Lusaka	Tel 260-1-254303/6 ext 140 cmuyunda@usaid.gov
WFC (Women for Change)	Z11	Record lost		PO Box 33102, Lusaka	Tel 260 1 224309 Wfc@zamnet.zm www.wfc.org.zm

N. B. Code numbers have been allocated by meeting. Different meetings with members of one organisation have been given individual codes. When a number of people were present at the same meeting they all share the same identifier.