



Meeting the HIV/AIDS Challenge to Food Security the role of labour saving technologies in farm-households

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Building Regional HIV Resilience
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FOREWORD

The acute labour shortage created by HIV/AIDS and its severe consequences for agriculture production and food security of rural households has been well documented. One of the promising strategies for response from the agriculture sector to the impacts on labour is to identify the roles for **labour saving technologies** (LSTs) not only in mitigation, but also as part of prevention. Such issues are gaining practical importance because the connection between malnutrition, hunger, famine and HIV/AIDS is now beginning to be made. The drama is emerging at national levels, but is also played out, often invisibly, in a multitude of farm-households in which widows, grand parents and children suddenly take on roles they are unprepared for. Strategies for effective action are urgent.

FAO/SDWP commissioned a paper on the issue of LSTs for the meeting “African Asian Agricultures Against AIDS”, held in Bangkok from 11 to 13 December 2002, jointly organised by UNDP South East Asia HIV and Development Programme and FAO. The paper was discussed at the meeting and subsequently revised. At the meeting, very concrete examples of LSTs were also presented and will be published in a companion paper. As the meeting confirmed the promising role of LSTs as one of the major responses of the agriculture sector against HIV/AIDS as well as the role South-South cooperation can play in this area, the paper is being brought to the attention of a wider audience working in the fields of agriculture, HIV/AIDS or, more generally, of development.

The paper focuses on the various types and levels of constraints faced by farm-households as a production and reproduction system within a farming system such as time and energy limitations created by HIV/AIDS provoked shortages. The paper highlights the contributions various LSTs could provide while also stressing the conditions -including gender ones- which have to be met in order to introduce LSTs successfully. LSTs are a partial solution to HIV/AIDS problems, but also represent a challenge to the way agriculture is practiced and to common policies in both agriculture and HIV/AIDS. The focus on LSTs is a fertile field for cooperation between sectors, between public and private institutions, North-South and South-South cooperation.



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Meeting the HIV/AIDS Challenge to Food Security the role of labour saving technologies in farm-households¹

By Jacques du Guerny²

I. INTRODUCTION

The impacts of HIV/AIDS on agricultural production and on food security have been described in a number of studies and papers³. In *Agriculture and HIV/AIDS*⁴ the argument was made that the major contribution of the agricultural sector against HIV/AIDS was to focus on the issues where it had a comparative advantage rather than attempting to carry out activities where the health sector was better equipped. From this perspective, a promising area of intervention for the agricultural sector and engineers is that of labour saving technologies (LST)⁵. One has to, however, keep in mind that in the case of resource-poor producers, agricultural production technologies need also to be capital saving, as credit or cash are not readily available.

The previous statement might appear, at first sight, to those not familiar with the agricultural sector as a bit far fetched. But its relevance becomes clear if one recalls the mechanisms through which HIV/AIDS impacts a farm-household: destruction of the labour available through reduction in its numbers, the time and energy available and the knowledge necessary for production.

In this paper, we are focussing on food security rather than on agricultural production which can be done outside of the farm-household unit, e.g. commercial farms. This food security focus is because one of the effects of HIV/AIDS on the farm-household is to provoke a retrenchment: cash crops, fields located far from the homestead, certain less vital production tasks (resulting however in lower yields) are abandoned and all the efforts of the farm-household members are concentrated on the essential strategy for survival through ensuring their food security. Furthermore, following an HIV/AIDS related sickness or death, food security is maintained through revising the complex division of labour of the farm-household in line with the farming system the farm-household is embedded in.

¹ Paper for African Asian Agricultures Against AIDS Consultation, Bangkok, 11-13 December 2002. Meeting jointly organised by FAO/SDWP and UNDP South East Asia HIV and Development Programme.

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Photos illustrating the paper are by: i) Jacques du Guerny: on the road from Lijiang to Dali, Yunnan Province, China, October 2002, ii) FAO

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³ See various papers of FAO which can be found at : http://www.fao.org/sd/eims_search/webpage_result.asp?agrovoc=9000077&category=24&lang=en;

the joint publication by FAO and UNAIDS, *Sustainable Agricultural/Rural Development and vulnerability to the AIDS Epidemic*, <http://www.unaids.org/publications/documents/sectors/agriculture/JC-FAO-E.htm>.

⁴ Jacques du Guerny, *Agriculture and HIV/AIDS*, February 2002, UNDP SEAHIV/FAO/EASE International, <http://www.hiv-development.org/publications/Agriculture.htm>.

⁵ Technologies are understood in a broad sense of methods and inputs used in farm production, e.g. cultivation practices, varieties, cropping patterns, fertiliser use, tools, harvesting methods. From T.W. Schultz, *Theories of Agricultural Development*, Technological Change, www.library.uq.edu.au/bio/lectures/arec3002_2001/arec3002_theory_technology.ppt, Un-dated.



Picture A: Upland rice...

or maize...

= Food Security

There are two approaches possible. In a paper on technologies, one could expect that one would start from a technology. For example, how a hoe can be improved in order to adapt it to the strength of the very young⁶ or of an elderly person and thus help them carry out with less fatigue certain tasks. In this paper, however, we propose to approach the issue from the perspective of the *food security of the farm-household*: such an approach introduces a holistic view of the basic production unit as well as of its food security which is necessary because the two are inter-related, and, particularly in times of stress, there are trade offs between the two. The farm-household is also, importantly, the smallest unit open to policy interventions. It is thus not proposed to examine the role of labour saving technologies *per se*, in isolation, but within this broader framework.

It should be clear that the scope of the paper is therefore narrower than what would be covered by a rural livelihoods approach. This is a deliberate choice because, on one hand, farm systems represent frameworks designed for agriculture sector analysis and interventions and, on the other, farm-households are the field level at which extension workers operate. This does not mean that one should rule out livelihood approaches, but, from the perspective of immediate interventions by the agriculture sector, it would be preferable that it build its own capacity and gain experience before partnering with other sectors to address broader issues.

1. Inserting LSTs in a broader development framework

As mentioned, one can place the discussion of LSTs within a broader development framework. Until now, AIDS programmes have mostly tended to focus on individual behaviour and risk reduction. When AIDS programmes look beyond the individual, it is mostly to focus on the groups they belong to, e.g. commercial sex workers or youth. In this paper, one is concerned by the consideration of the systems individuals are part of. Most of the rural population belongs to the farm-household system, itself embedded in a farming system. It is this complex embedding at different levels which ensures the food security and survival of individual members of the farm-household. This inter-relationship functions in both directions: i) the farm-household needs the sum total of the organised roles of the individual members and, ii) each household member needs the umbrella formed by the farm-

⁶ It should be very clear that child labour is not being recommended or condoned! However, the sad reality of child labour in farm-households affected by HIV/AIDS should be recognised and strategies devised to protect and support the children.

household and the contributions of all its other members. One is thus looking at individuals as members of the farm-household system rather than as individuals *per se* or belonging to a homogeneous group such as sex workers, truck drivers or youth.

Thus it should be clear that an AIDS sickness and death of a farm-household member affects not only the other members emotionally and as individuals, but the very continuation of the farm-household itself on which the other members are dependant for their own survival. One can note that it is not enough for policies and programmes to target individuals without ensuring the sustainability of their farm-households, otherwise the individuals are at risk of becoming loose atoms.

Ensuring the sustainability of farm-households, as well as that of their farming systems, is precisely where the agriculture sector can create a synergy with the AIDS programmes. To draw lessons from and avert the famine and hunger associated with the AIDS epidemics in Southern Africa, as well as to prevent such potential crisis in other parts of Africa or in Asia, national AIDS programmes must concern themselves with the sustainability of farm-households and the food security of their members. Of course, this does not mean that AIDS programmes should get involved in agriculture production any more than the agricultural sector should do condom promotions for HIV prevention. What it signifies is that AIDS programmes should initiate dialogues with the agriculture sector institutions in order to promote the resilience of farm-households and farming systems under the threat of HIV/AIDS. Such promotion is not self-evident as the agriculture sector generally gives priority to the production aspects of its mandate over those of the welfare of the rural population, taking rural populations too much for granted. One strategy to improve the welfare of the rural population is to ensure the sustainability of the farm-household: a new balance between production priorities and those of rural development (including welfare) is important.

It is in such a broader development context that the following discussions on LSTs should be considered.

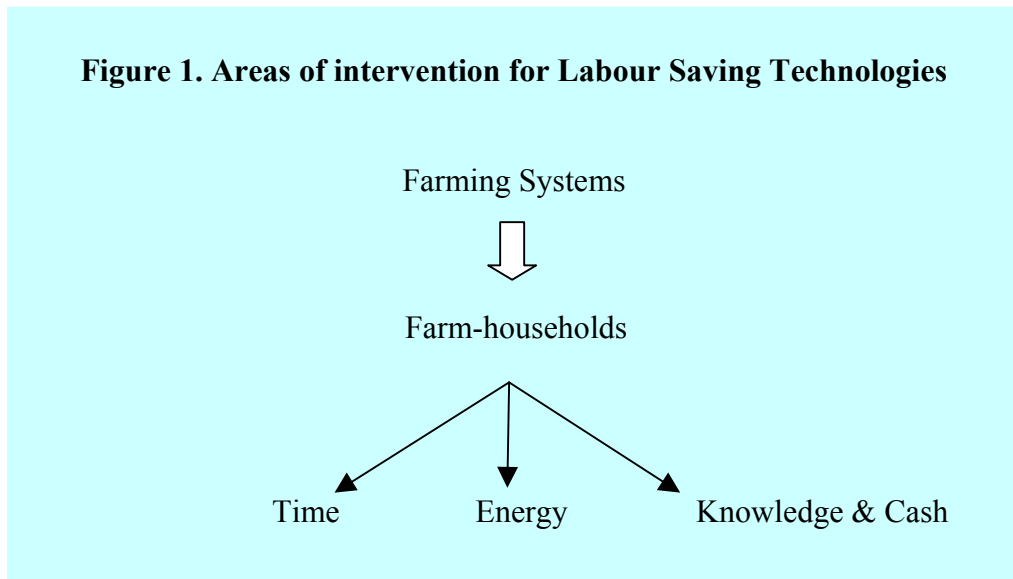
A common misconception can now be dispelled: one often hears that there is an abundance or surplus of agricultural labour in a given location and therefore substitutions are possible without affecting overall production. Here, one must point out that this argument does not hold true at the level of the farm-household: the farm-household is trapped within its dwindling resources when it faces a labour shortage due to an HIV/AIDS related sickness and death. The supply of labour outside of the farm-household is generally not affordable to most of the farm-households and therefore not a solution. Building the resilience of farm-households and of the corresponding farm systems is therefore essential both to AIDS prevention and mitigation and to sustainable rural development.

2. Objectives of the paper

LSTs modify the time and energy required for certain tasks. This is therefore an important factor in circumstances in which the labour factor is being modified by HIV/AIDS. The paper will first examine at a *micro-level* key components of labour requirements of the farm-household in times of HIV/AIDS and then move up to a more *macro-level* to examine farm-household systems and farming systems facing the challenge of HIV/AIDS. This approach at two levels is necessary in order to discuss the role of LSTs in ensuring the continuation of the farm-household and the food security of its members (see Figure 1). One will see that interventions regarding LSTs are possible at both levels and in multiple aspects of each, but

that they require conditions that can be difficult to meet: this of course, does not mean that they are not important... It is a real challenge!

Figure 1. Areas of intervention for Labour Saving Technologies



II. THE SURVIVAL OF THE FARM-HOUSEHOLD CONFRONTED BY HIV/AIDS

As the expression “farm-household”⁷ conveys so well, this unit is composed of two elements: i) the farm production and, ii) the household, which ensures the maintenance and the reproduction of the unit. A number of individuals belong to this unit: they live in the unit, but can also partly live outside in the case of a migrant to a city who sends back remittances or who returns to the farm-household at certain times of the year (e.g. harvest time) to contribute labour. The inclusion of the latter is not customary in household definitions, but is now necessary as farm-households are rarely autarchic and more and more included and dependant on the market economy, not only through the sale of production, but also through the contribution of out-posted members. In an epoch of HIV/AIDS, this is all the more important that out-migrants who fall sick with HIV/AIDS often return to their farm-household to be cared for and to die there. This situation has very serious consequences for the farm-household: extra food required, time required for care which reduces the time available for production tasks, cost of medicines (including of traditional medicine), cost of funeral.

The importance of the farm-household cannot be overemphasized because it is the glue which holds the members together. When it collapses due to the fact that its members cannot cope with the impact of HIV/AIDS, this means they do not have the required time and energy to ensure the tasks necessary for the continuation of the unit as well as ensure minimum food security. When this happens, its members, or at least some of them, have to leave. The family thus disintegrates into separate individuals: children are fostered to relatives (sometimes separated from one another) or drift to towns to become street children; widows can be “inherited”; elderly abandoned, etc. It is an important policy objective to ensure that the

⁷ The term « rural household » is therefore broader because it includes households that are not engaged in farm production, such as village shops. Of course, LSTs have contributions to make beyond the farm-household, but this is beyond the scope of this paper.

family unit can continue as often and as long as possible⁸ and one of the strategies which can help in its survival is LSTs.

From the perspective of this paper, labour includes three important components as shown in Figure 1: i) *time* available and used for work, ii) *energy* available and required for tasks and, iii) *knowledge* necessary to work (agricultural practices, use of tools, etc.) as well as the *cash* for acquisition and implementation of LSTs.

1. The time component

By focussing on the micro-level farm-household unit, the discussion is not fitted within the classic framework of agricultural economists⁹ which stresses that a shortage of agricultural labour creates favourable conditions for mechanisation whereas its abundance promotes intensification of land use. Such generalisations are macro-level ones, but do not help here because at the level of the farm-household, it might not have the resources to move into upgrading the technology nor to hire the missing labour when its assets are depleted by HIV/AIDS. This is why it is of vital importance to introduce LSTs which maximize returns per unit of labour.



Picture B: For millions ...

... and millions

⁸ Postponing the collapse of a farm-household is a valuable strategy in itself as it can enable the orphans time to acquire marketable or agricultural survival skills, grow up to be in a better position to face the outside world or restart farm production while protecting their rights to the land.

⁹ Hayami and Ruttan. It should also be noted that the ageing of labour is another factor promoting mechanisation. However, a severe HIV/AIDS epidemic accelerates the ageing of populations, but destroying assets makes the purchase of mechanical tools difficult if not impossible: Jacques du Guerny, *The Elderly, HIV/AIDS and Sustainable Rural development*, AARP and FAO 2002, http://www.fao.org/sd/2002/PE0101_en.htm

The farm-household is not located in a vacuum, but in a certain environment which has resulted, through time, in creating a farming system adapted to the farm-household, ensuring most of its livelihood and vice-versa which the farm-household is able to perpetuate (up to a point at least). This symbiosis is crucial for agricultural policies and programmes because they can intervene at both levels: a change in the farming system by promoting a less labour intensive crop can result in decreasing labour requirements, just as promoting credit can assist farm-households in accessing labour saving technologies. In fact, LSTs are key strategies at both these levels and this is why it is proposed to elaborate further on the relationships linking farming system to farm-household systems.

A pioneering study by Stuart Gillespie in Rwanda already presented in 1989 was precisely focused on this relationship¹⁰! The objective of the study was to determine the relative sensitivity of farming systems to AIDS related loss of labour. The study considered six features of labour organisation: i) seasonality (including bottlenecks), ii) specialisation (by gender and age), iii) interdependence, iv) labour economies of scale (and, importantly, the fact that in subsistence farming there is a disproportionate decrease in outputs when there is a decline in labour input when the number of people working is reduced), v) ecological potential for supporting less labour intensive systems and, vi) the technical possibilities for substituting LSTs to labour. Individual labour data were then aggregated for an average household of two adults and three children. Then, the labour requirements for the main crops were estimated which enabled one to estimate labour availability and balance both by season and gender. Retrospectively, what appears to be missing is off-farm labour and sources of income. Still, for the late 80's this study was very original, forward-looking and provided some basic data which, as the HIV/AIDS epidemic had not yet sufficiently made its impact felt, permitted a discussion of the *expected different impacts* of an AIDS death, by sex, on a particular farming system as well as *compensation mechanisms* through reallocation of time. However, this reallocation of time results in modifying the farming system and affecting food security, especially if women allocate time previously devoted to food preparation and child care to food production after the death of the male member of the farm-household. It was also clear that the death of both parents led to the destruction of the farm-household.

The conclusions of the study review a number of potential changes in agricultural practices, in particular to: i) protect soil fertility, ii) provide diverse and nutritious foods (that can be harvested throughout the year) and, iii) reduce the domestic workload of women. Another area identified for reducing work-loads was to promote means to reduce essential non-agricultural tasks such as fetching water and fuel.

Although the study provides estimates of the population involved in each farming system, the estimates are not related to the vulnerability to labour loss of each type of system despite their usefulness in setting policy and programme priorities.

The study showed that farm-households are more or less sensitive to an AIDS death depending on the labour requirements of the farming system they live in. This implies that policies addressing vulnerable farming systems and their labour requirements as well as assisting them in evolving towards less demanding requirements are promising areas for intervention. The study also showed that there is a *labour balance*, which means the time not used up by agriculture or domestic work. The remaining time can serve as reserve to face unexpected labour needs and its amount depends on the type of farming system. This time

¹⁰ Stuart Gillespie, *Potential impact of AIDS on farming systems – a case study from Rwanda*, in: Land Use Policy, Butterworth & Co (Publishers) Ltd, 1989.

balance enables the farm-household to withstand shocks, such as an AIDS death, but only up to a certain point (e.g. in certain farming systems, women dispose of less time than in others and the possibility for reallocation is limited) and at the cost of certain tradeoffs (e.g. work of youth and of children).

2. The energy component

The Gillespie study focussed very much on the time component of labour requirements and constraints. Another component is crucial, i.e. the amount of energy required for the various farm and household tasks, its timing, distribution among household members and availability.

A farm-household produces crops and juggles simultaneously throughout the agricultural cycles the husbandry of various plants and animals. This complex time management of multiple tasks for the various members of the household, ranges from cash crops to homestead herbs and from cattle to chicken. Energy is required from each member for these production tasks, as well as for domestic tasks such as fetching water and fuel. The human energy from the farm-household members for production and household tasks can be enhanced or substituted to a certain extent by LSTs or by hired outside human labour which implies the availability of cash from market sales or off-farm labour and remittances. Communal work groups can also provide a farm with many hands for certain tasks such as raising a house frame or looking after cattle: however, these groups are based on reciprocity and a farm-household with reduced labour and energy due to HIV/AIDS is frequently unable to contribute and therefore to claim assistance when it needs such communal assistance the most.

In fact, besides the energy required for the tasks referred to, most human energy of farm-households is needed to maintain the body of all the members whether they are productive or not, e.g. the energy for growing children who are not expected to help much because they go to school. In fact, the energy available for work is but a small portion of the total food energy required for the maintenance of the family members.

Table 1. Example of the desirable energy allowance of a family of an Asian LDC and maximum energy available for work

| Farm-household member | Age in years | Basal Metabolic Rate (BMR) based on weight, in kcal/day | Average individual need: total kcal/day | Maximum energy (kcal/day) average for work (difference between BMR and individual need: col 4-col 3) |
|-----------------------|--------------|---|---|--|
| Husband | 30-59 | 1472 | 2679 | 1207 |
| Wife | <29 | 1127 | 1881 | 754 |
| Son | 15 | 1411 | 2285 | 874 |
| Daughter | 13 | 1155 | 1824 | 669 |
| Son | 11 | 1108 | 1905 | 797 |
| Daughter | 10 | 1036 | 1710 | 674 |
| Grand mother | >60 | 1046 | 1632 | 536 |

Columns 1-4 extracted from Table 1.10 of James and Schofield

BMR: Basal Metabolic Rate=the minimal rate of energy expenditure compatible with life. Therefore the maximum energy available for work is a real maximum because other activities would reduce it.

One can illustrate this by expanding on the work of James and Schofield¹¹ which this section borrows heavily from. We establish the energy requirements of an hypothetical family of an Asian least developed country (LDC). See Table 1.

The needs given for the husband and wife correspond to the average physical activity level (PAL)¹² estimated for subsistence farming, animal husbandry, forestry, fishing and hunting occupations (James and Schofield Table 3.7).

Table 2. Occupational Physical Activity Level values for subsistence farming in LDCs

| Adult Males | Adult Females |
|-------------|---------------|
| 1.86 | 1.69 |

The numbers given in Table 2 are multipliers of the BMRs of husband and wife in Table 1. They correspond to averages. Activities such as weeding, clearing land, pounding rice, hoeing or cutting sugar cane require much higher expenditures of energy: four to nearly seven times the BMR. It is clear that energy demanding activities cannot be sustained for long by individuals and that they will be carried out at the expense of other tasks. In the absence of LSTs, the husband and wife team quickly run into energy expenditure limits which place a ceiling on the type of activities they can carry out and the duration of such activities. Furthermore, if the husband has died and a task requires a high level of energy which only the husband had, the widow cannot always substitute. She would have to team up with the eldest son or ask for outside help (which is then often paid by sex if there is no cash or when cash needs to be saved for other purposes).

Some further remarks on these two tables.

- As can be seen from this hypothetical example, if only the husband and wife work, with a total maximum of less than 2,000 kcal/day available for activities, they have to provide a total food energy for the entire household of 13,916 kcal/day. This implies they have very little margin of manoeuvre and explains why subsistence farmers are reluctant to assume risks they believe they can ill afford. Consequently, the difficulties outsiders often face in introducing LSTs under such conditions. The paradox is that LSTs would be all the more useful: policy and programme interventions need to find ways to overcome such constraints with the help of technical experts.
- The handicaps in ensuring food security faced by households in which one or two parents have died and which are headed by a widow, a grandparent or an orphan are thus striking when seen through the energy lens. LSTs need also to be examined in such a context.
- In the case of the death of the husband, it is clear that the widow cannot generally maintain the farm-household without the assistance of the children (at least the older ones): as they already often contribute to production and domestic activities (e.g. fetching water or fuel), this implies that they can be pulled out of school (saving the school fees) to work on the farm-household and/or find paid odd jobs.

¹¹ W.P.T. James and E.C. Schofield, *Human Energy requirements – a manual for Planners and Nutritionists*, FAO and Oxford University Pres, 1990.

¹² The PAL is the total energy requirement for a 24-hour period and is expressed as a multiplier of the Basal Metabolic Rate given in column 3 of Table 1.

- When bringing together the time study of Gillespie and the energy issues, one notes that the slack time identified can also be due to the energy ceilings just discussed (there simply is not the individual energy necessary to carry out more tasks even if the time is available) and, therefore, reserve time identified in the previous section might not be as available for agricultural activities as it would seem. Energy expenditures constitute a real bottleneck.
- Time and energy constraints reinforce each other at times of seasonal peaks in labour requirements (harvesting, etc.). As mentioned earlier, farm-households affected by HIV/AIDS sickness and death are often unable to call on community labour groups for help in replacing the missing labour because they will be unable to repay in the future with their own labour: introducing LSTs to overcome such constraints would be most useful.



Picture C: Labour Saving Technologies...

Tables 1 and 2 do not take into account HIV/AIDS infection and the resulting increase in energy and protein requirements¹³. For the sake of simplicity, we shall briefly discuss energy (although proteins and micronutrients are crucial for HIV infected persons): adult males need approximately 400 additional kcal/day and adult females, 300. These additional calories can be expected to be deducted from the energy available for work and amount to a third or more of the energy available. One can thus see that the theoretically available farm-household labour (see Table 1, column 5) is considerably reduced after an HIV infection. As the incubation period can last several years, the farm-household output can be reduced during this period. The food security of the household and its members is directly affected. It is well known that labour shortages result in shifting to less nutritious crops in HIV/AIDS affected households: this is to the detriment of the infected people, but also to that of the growth and

¹³ For the section on nutrition, the author is indebted to personal communications from Karel Callens (FAO/ESNP). The responsibility for the interpretation is the author's.

health of the children. LSTs which help to maintain a variety of foods, including of nutritious ones, for the household members are therefore important. This is all the more true for any HIV infected member, especially as quality nutrition helps fight off infection and maintain a normal level of activity. Thus, the issue of diversifying the production in a farming system becomes important.

In this connection, it is important to strengthen the role of food, both from an energy, but also from a micronutrient and protein perspective, in keeping HIV infected parents alive (already an important objective in itself) in order to postpone the age at which children could become orphans. The chances of an orphan headed household of coping with the situation increases with the rising age at which orphan hood can occur, especially of the child heading the household.

3. Some remarks on gender, time and energy¹⁴

When one considers together the total time and energy available in a complete (with male and woman both contributing to the farm-household work or income) farm-household for work in both production and in the domestic reproductive tasks, one can observe from the previous sections and tables that there is not much lee way to face disaster based on the total time and energy available to the household. In addition, farm-households today increasingly rely on one member providing off-farm income through permanent or seasonal labour in cities, mines, etc. The fact that either male or female members are the source of much of the off-farm income is too often overlooked as this income allows the farm-household to cover costs for school, health and nutritional supplements.

Many studies have highlighted the role of women in food production, as well as taking care of most of the domestic tasks. The lenses through which the role of women has generally been seen have been those of equality or equity as well as those of women in development (WID). However, when one considers the farm-household in an HIV/AIDS epidemic environment, one has to look at the farm-household as a unit in which there is a complex division of labour by sex and also by age in order to perform all the necessary tasks to ensure the food security of all the members of the farm-household: AIDS sickness and death destroys the availability and the division of labour compromising the survival of the farm-household and its food security. One has therefore to adopt a *gender*¹⁵ approach focusing on the relations between the males and the females and how these relations determine the extent to which the production and reproduction tasks are carried out in both the *farm* as well as the *domestic* components of the farm-household.

Time budgets, agricultural calendars and energy available show women do not have slack time, nor the energy to replace the contribution of the male members when it is required in case of his death. The corresponding sources of off-farm income dry up and the assets are depleted: the widow is not able to substitute herself to the dead male members. Such substitution would even be impossible in many cases, for example, if the husband was working in a distant mine or in another country. It is not feasible for the widow to abandon the

¹⁴ The two gender sections have been included at the suggestion and with the assistance of Lee-Nah Hsu in order to highlight the critical gender dimension for analysing the contribution of LSTs in the context of HIV/AIDS.

¹⁵ Jacques du Guerny, Elisabeth Sjoberg, *Inter-relationship between gender relations and the HIV/AIDS epidemic: some possible considerations for policies and programmes [editorial]*, **AIDS**, 1993 Aug;7(8):1027-34. Reprinted in: Jonathan Mann, Sofia Gruskin, et al, **Health and Human Rights**, Routledge, 1999.

children and farm-household: she is trapped in this worsened new situation. However, such a situation is not symmetrical for the widower who may continue to maintain an off-farm income and pay for some of the tasks previously performed by his wife, but the situation is less common and has not been much studied.

Under such circumstances, an AIDS widow can only retrench to a certain point beyond which the farm can no longer produce the food needed for the family even if domestic tasks are largely sacrificed in the attempt to ensure a minimum food security. It is clear that the widow will find herself under pressure to involve as far as is possible any elderly parent available and pull the children out of school and put them to work, even if their contribution is marginal compared to a grown man (see the previous sections on time and energy and Table 1 on energy). Still, having the help of the children, cuts school costs on one hand and, on the other, makes time available from the children for less energy demanding tasks.

As caring of the sick is a traditional task assigned to women (and daughters – with possible consequences on schooling), AIDS related sickness will tax to the maximum the time and energy budgets of the farm-household women. These women often first have to tend the sickness of the male, but might also have to tend to a sick child, either born HIV infected or simply more sickly because less well cared for as a result of the reallocation of resources due to the sickness of the male. If, following the death of the man, the widow was also HIV infected and falls sick, then the burden of care is often shifted to the daughters, sometimes even if a grand mother is present.

It would thus seem that the traditional gender division which is designed to withstand shocks, including death, is not able to cope with the magnitude and protracted effects of HIV/AIDS. Gender and agriculture specialists need to examine the gender division of labour in different farm-household systems, and in particular the potential role of LSTs in the AIDS context. LSTs which assist in the reproduction tasks can enable the female to reallocate time to farm production to ensure food security while avoiding sacrificing too much the quality of the domestic tasks.

4. The knowledge and cash component

We have already mentioned a number of issues in this vast area, therefore we will just make a few points in relation to LSTs.

It has often been stressed that the knowledge of the person who has died of AIDS has not been transmitted to other members of the farm-household: this is a serious issue, but it is not directly related to LSTs as there is no change in technology. The issue of knowledge in our case is of a different nature: in order to survive with less labour, changes have to be introduced into both the production as well as in the domestic work. This is all the more important that there are more AIDS widows than widowers: the widows normally have to juggle with the two.

The *first* difficulty faced by the members of the farm-household is to explore the options available to them, including introducing LSTs. The members might not be aware of the options and could need assistance in such an area. It would be useful to make a distinction between indigenous knowledge already available which can be built upon and knowledge which needs to be brought in from outside. *Second*, once the options are identified, there is the danger of either rushing head long into a LST or of rejecting it through lack of knowledge and information. *Third*, if an LST has been chosen, then there is the difficulty of providing the

specific knowledge permitting to adopt it successfully. *Fourth*, knowledge by itself cannot generally be acquired without outside support, ranging from technical aspects to credit. This is why the issue of the cash necessary to acquire and implement the LSTs is not presented as a distinct component as it is intimately related to the issue of knowledge. LSTs are not cost free: ranging from the acquisition of better quality hoes which can be used by elderly or children when the blade is used up, to changing cultivation practices (e.g. from ploughing to no tillage) which requires some investments in simple equipment and, more importantly, the capacity to hold out through the transition period. Depending on the changes introduced and the knowledge required for carrying out the changes, appropriate financial resources have to be found within the farm-household, the community or outside institutions. These economic dimensions of LSTs and their financing need to be explored concretely in different scenarios and settings. All this implies holistic approaches involving as far as possible the community in order to build a collective base for knowledge as one can expect other cases of AIDS deaths to occur. More generally, community involvement is necessary to build social capital to help the farm-households having to utilize LSTs.



Picture D: ...are more

... than just machines...

As one can see there are important constraints to introducing LSTs. Despite these, LSTs constitute a survival strategy from the farm-household perspective, an opportunity for policy makers to introduce change while promoting rural community resilience.

5. Some further remarks on gender, knowledge and financial resources

Many studies have highlighted the division of labour and the accompanying division of knowledge in the farm-household. For example, the man knows techniques of ploughing, growing cash crops and animal husbandry whereas the woman would know growing of food plants, post harvest processing and care of children. Studies have also shown the disruption by AIDS in the transmission of knowledge from father to son and mother to daughter and the difficulty of changing the gender assigned divides of knowledge. When introducing LSTs, which are often new to the farm-household, can occur in a context in which there might not have been a clear gender assigned attribution. It is perhaps a unique opportunity to promote survival with empowerment through new gender role assignments. This is an area where gender specialists could provide an important contribution.

One of the important issues is that of the vulnerability of the farm-household to loss of financial resources due to AIDS. As mentioned, certain household members are often the source of off-farm income. Such income is important if not vital for the farm-household. What are the options then available to the widows, elderly or children? In the case of AIDS widows, they tend to be young because AIDS hits the younger productive age group and the wives are usually younger than their husbands: there can be pressure to engage in the exchange of sex for services (and cash) and the widow might see this as an option to access cash necessary for the family. If one recalls the time and energy constraints, one can see that many factors contribute to such an option. Here, it should be mentioned that daughters might also feel a social pressure to earn some income to help the family or themselves and chose similar options.

These remarks illustrate the urgent need to equip women and children with income earning skills in order to provide them with effective alternatives to sex work. This should be a priority, regardless of AIDS, as an important means of empowerment: AIDS is another argument of weight for action to be taken in building income generating skills. The introduction of LSTs could represent an opportunity in the acquisition of such skills.

III. THE FARM-HOUSEHOLD AND THE FARMING SYSTEMS AS FRAMEWORKS FOR INTRODUCING LSTS

We will first examine the farm-household and then discuss briefly the farming system level. The need for holistic strategies which include LSTs has already been stressed in the paper. The point is reiterated here that these are necessary at each of the two levels as well as jointly.

1. The farm-household

a) HIV/AIDS driven changes in farm-household composition

A recent joint IFAD/FAO study¹⁶ in rural areas of very high HIV prevalence rates (20 – 30%)¹⁷ has used a classification of households which can be very helpful for policies and programmes. The study collected data for “married households” (MHH) which are households with both husband and wife, plus children; “female headed households” (FHH) which are households headed by widows; “single male headed households” (SMH) which are households headed by widowers; “grand parent headed households” (GPH) which are households in which both parents have died and are headed by a grandparent; and “orphan headed households” (OHH).

The relative frequency of each type of household is provided: 60% for MHH (60% of which have added 2 or 3 orphans to their own children), 15% FHH, 8% SMH, 10% GHH and 5% OHH. Although the two areas studied might not be representative of “Africa”, they do show

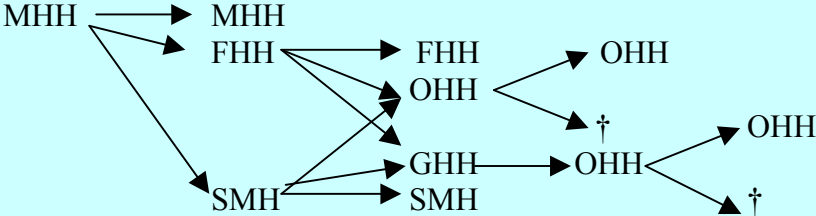
¹⁶ Maren Lieberum, *Labour saving practices and technologies to address labour constraints imposed by HIV/AIDS*. Conducted in June 2002 in Nyanza and Western province, Kenya. Funded by the Japanese Government and FAO/SDWP.

¹⁷ Although this point is not directly related to the topic of the paper, the author would like to stress that it is only very recently that it is acknowledged there is a rural epidemic: HIV/AIDS was considered largely an urban phenomenon, in part because that is where the sentinel surveillance system and means were located. As late as 23 June 2000, the New York Times could feature an article by McNeil “AIDS is moving into rural areas, UN study says”. Years have thus been lost in preparing rural populations to face the issues related to HIV/AIDS, find responses in prevention rather than mitigation, etc. Too often, institutions and decision-makers consider that they are not in a position to defuse a possible time bomb until it is proven to be one, by which time it is too late!

what can happen in a rural population when HIV/AIDS has been around a number of years at high levels of HIV prevalence. One will note in particular that if one takes into account fostered orphans, less than 25% of households are normal ones, i.e. ones which have not been affected by HIV/AIDS! Three rural households out of four are thus affected by HIV/AIDS in their labour or food security: either less labour and/or more mouths to feed!

The study also shows how each type of household is affected differently in its labour availability and, in consequence, in its food security. One can clearly note if and when a household changes from one type to the other, the situation worsens until it can become untenable and the household dissolves. We have represented this in Figure 2.

Figure 2. From a complete farm-household to its possible dissolution through HIV/AIDS generated labour constraints



Legend:

- MHH = Husband and wife headed farm-household
- FHH = Widow headed farm-household, SMH = Widower headed farm-household
- OHH = Orphan headed farm-household, GHH = Grand parent headed farm-household
- † = Dissolution of farm-household.

Figure 2 shows how a MHH can, in the best case scenario, remain a MHH, i.e. uninfected by HIV, or become a FHH on the death of a husband, or a SMH on the death of the wife. Then the latter two types of household can remain the same or change into a weaker and more vulnerable form of household with less labour and food security (GHH or OHH), etc.

It does not seem that data are available on the transition probabilities from one state to another (or of remaining in the same state). As the farm-households are embedded within a farming system, ideally, such data should be collected or assembled also by farming system as will be mentioned later. It should be noted that practices such as widow inheritance result in going back one state (from FHH to MHH), but usually under less favourable conditions. Data on the time table of transitions would be useful for organising interventions. For example, a certain percentage of farm-households remain in their initial stage rather than moving down the ladder: a widow is not always HIV infected and can maintain the farm-household and raise the children, but she might also be HIV infected. If that is the case, whether she survives her husband by one year, five years or ten makes a big difference to her, of course, but also to her children¹⁸: in the best case scenario, these children might even escape orphanhood.

¹⁸ In this connection, as mentioned in the section on energy, nutrition takes on a considerable importance in general, but also as a goal for LSTs.

b) Policy implications of AIDS driven changes in farm-household composition

HIV/AIDS thus leads to a transformation process, each time to a more vulnerable and less productive type of farm-household through stages preceded by a period of sickness in which more and more assets are lost. What Figure 2 shows is that agriculture and domestic strategies have to be tailored to meet each situation, taking into account the fact that one does not know (the households themselves do not know) whether a member is HIV infected or not and whether and when the household can change into the next type of farm-household composition.

The study shows that one has to consider the farm production and the domestic work as forming a whole with tradeoffs between them. Agricultural and food security strategies cannot ignore the time and energy required for domestic work, otherwise they may be totally impractical. Considering the time and energy necessary for fuel and water collection and their negative impact on production, these are two areas where LSTs would be essential to maintain food security. Until these problems are solved, probably nothing very much can be done on the agriculture side.

Another important issue is that as farm-households drop down an increasing scale in vulnerability, mitigation strategies become increasingly important, but the conundrum to be solved is that the households have less and less means to adopt LSTs when they need LSTs the most. One partial solution is to introduce LSTs to farm-households early, before HIV/AIDS possibly strikes them. This is an important policy consideration for Asian and African countries and rural areas where the HIV prevalence is still low: such a window of opportunity should not be missed. If the farm-household is spared by HIV/AIDS, it will benefit from the new technology. If the farm-household is affected by HIV/AIDS, then it will, hopefully in many cases, have had time to organise any transition necessary for the introduction of LSTs. Outside support is essential in these cases, both from the community, but also from higher public levels (e.g. through extension support, demonstrations, rural credit).

It should be stressed that AIDS strategies have targeted rural populations as if households were static, with a fixed composition, ignoring the dynamics in the changes in the composition of the farm-household. The farm-households are taken as irremediably constituted by a husband and wife, by female headed households or by orphan headed households. They have not taken into account the fact that the composition is not fixed, for example a female headed farm-household can become an orphan headed one if the widow is also HIV infected and dies. In order to be effective it would be important to tailor interventions not only to the present type of farm-household, but to take into account the fact it might only remain in its present state a limited time before changing again: in such a context, prevention and mitigation need to integrate the *time* and *change* factors. Furthermore, AIDS strategies have mostly ignored the grand parent and widower headed farm-households. Strategies need to be designed for these situations, especially as one can expect their frequency to increase because of the AIDS driven aging of population and the changing sex ratios of HIV/AIDS infections. Similarly, agricultural and rural development strategies have to adjust to each farm-household type of composition. Although extension workers have already difficulties to deal with female headed farm-households, they need to develop methods to deal with the other types as well! More importantly, the role of agriculture production, food security and rural development need to be re-examined taking into account the dynamics at play. Agriculture policies designed on the assumption of husband-wife farm-households might be less and less relevant.

Taking these dynamics and issues into account leads one to consider that resilience building strategies have a fundamental role to play. In this case, resilience building means development strategies which can reduce vulnerability of the farm-household to the shock of the effects of HIV/AIDS: both sickness and death¹⁹. Realistically, and not cynically, one has to assume that many MHH will be affected by HIV/AIDS and it is at this level that agricultural resilience building policies can be introduced which can be of use if no HIV infection occurs and essential, if an AIDS death does occur, to the succeeding type of farm-household. One should explore an extended range of agriculture possibilities, including conservation agriculture and organic agriculture. For example, methods which eliminate the need for ploughing can assist FHH considerably in saving time and energy of the widow (and of the children if brought in) because this activity is the domain of men due to the strength required and the fact that they look after and handle oxen. Eliminating the need for ploughing and for most weeding can change the outlook for FHH, GHH and OHH. A lot of work is required on such issues, especially exploring the problem of overcoming the time lag, temporary increases in labour inputs, the need for investments and acquisition of knowledge before the change introduced is profitable²⁰. However, by the time a farm-household has become FHH, SMH, GHH or OHH, it is often too late to introduce LSTs which do not have an immediate benefit: the issue to be explored is how to introduce LSTs (considering their efficiency and saving contributions) when the farm-household is still at an MHH level.

2. The farming system

A recent FAO publication²¹ defines a farming system as “a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate”.

This definition leads to two remarks in an HIV/AIDS context: on the negative side, HIV/AIDS sickness and deaths can destroy the homogeneity of a farming system, with GHHs and OHHs dropping out of the farm-household type they were previously part of, whereas, on the positive side, a farming system is a useful unit for intervention. In fact, interventions can be designed to impact on either or both the farm-household and the farming system levels. Different farming systems should be analysed, not only to determine their vulnerability to HIV/AIDS, but more specifically to identify the potential role of LSTs in increasing their resilience and in preparing effective strategies for their introduction. In this respect, scenarios for the future should be developed and presented to decision-makers in the agriculture sector.

The FAO study identified *five main strategies* to reduce poverty in each farming system. We have selected examples from the Sub-Saharan and East Asian farming systems and presented in Table 3 how expert opinion ranked each strategy for each example of type of farming

¹⁹ For a discussion on vulnerability see, for example: Topouzis & du Guerny, *Sustainable Agricultural/Rural Development and Vulnerability to the AIDS Epidemic*, FAO and UNAIDS Joint Publication, December 1999. For a discussion on building community resilience, see for example: *Communities Facing the HIV Challenge: from Crisis to Opportunity, from Community Vulnerability to Community Resilience*, UNDP, South East Asia HIV and Development Programme, July 2002, ISBN 974-680-271-8, <http://www.hiv-development.org/publications/Crisis.htm>.

²⁰ See for example, http://www.fao.org/ag/AGS/AGSE/agse_e/5to/sorrens/summary.htm

William J. Sorrenson, Cesar Duarte, Justo Lopez Portillo, *Economics of No-till compared to traditional cultivation systems on small farms in Paraguay*, August 1998.

Frequently asked questions on organic agriculture, <http://www.fao.org/organicag/faq-e.htm>.

²¹ John Dixon, Aidan Gulliver with David Gibbon, *Farming Systems and Poverty – Improving farmers' livelihoods in a changing world*, FAO and World Bank, 2001.

system. The examples selected for Africa are represented in both East and West Africa, whereas the East Asian ones are mostly distributed in South East Asia and South West China.

Table 3. Some examples of potential and relative importance of household strategies for poverty reduction in Sub-Saharan Africa and in East Asia

| Region | Farming system | Strategies for poverty reduction | | | | | Agricultural population (millions) |
|---|---|----------------------------------|-----------------|---------------------|---------------------------|-----------------------|------------------------------------|
| | | Intensification | Diversification | Increased farm size | Increased off-farm income | Exit from agriculture | |
| Sub-Saharan Africa | Tree crop ²² | 4 | 1.5 | 1.5 | 2 | 1 | 25 |
| | Cereal-root crop mixed ²³ | 3.5 | 2 | 3 | 1 | 1.5 | 59 |
| | Pastoral | 1 | 1 | 1 | 2 | 5 | 27 |
| | Sparse agriculture (Arid) ²⁴ | 0 | 1 | 0 | 3 | 6 | 6 |
| East Asia | Lowland rice ²⁵ | 1.5 | 3.5 | 1 | 3 | 1 | 474 |
| | Tree crop mixed ²⁶ | 2 | 3 | 1 | 3 | 1 | 30 |
| | Upland intensive mixed ²⁷ | 1 | 3 | 0.5 | 3.5 | 2 | 314 |
| | Highland extensive mixed ²⁸ | 0 | 2 | 0 | 3 | 5 | 47 |
| <i>Source: Extracts of Tables 2.4 and 6.4. Dixon et al. Based on Expert judgement</i> | | | | | | | |
| Note: Adding the numbers horizontally for each line up to the agricultural population, not to be counted, the total score for each farming system equals 10. Expert assessments refer to poor farmers only. | | | | | | | |

For readers less familiar with farming systems, some explanations are necessary in order to understand the interest of the table. Brief descriptions of each of the farming systems selected are provided in the foot notes of column 2. By oversimplifying a bit, one can define the five strategies in the following way: *intensification* generally means increasing the yields; *diversification* exploits new market opportunities and crops; *increased farm size* often refers to clearing of forests for agriculture; *off-farm income* refers to searching for income outside of the farm, for example through seasonal migration to work in towns; and, *exit of agriculture*

²² Tree crop is centred on the production of industrial tree crops : coffee, cocoa, oil palm, rubber ; food crops are inter-planted between tree crops and are mainly for subsistence.

²³ Cereals such as maize, sorghum and millet are widespread and when animal traction is not available, root crops such as yams and cassava predominate. A wide range of crops is grown and marketed.

²⁴ It is mostly a pastoral system (cattle, sheep, goats and camels) with some agriculture as a livelihood complement.

²⁵ Dominated by rice with subsidiary crops such as oilseeds, maize, root crops, soybeans, sugar cane, cotton, vegetables, fruits. Livestock and off-farm income are integrated into this farm system.

²⁶ Where rice cannot be intensively produced. Centred on industrial crops : rubber, oil palm, coconut, coffee, tea and cocoa. Food and cash crops as well as livestock and off-farm incomes are widespread among small holders.

²⁷ Cultivation of a wide range of crops depending on local conditions. Rice is irrigated and livestock is important. Off-farm work is important.

²⁸ Often located in same area as the Upland intensive mixed (foot note 26), but at higher altitudes than the previous farm system, includes forest products and fruit trees, shifting cultivation and is the home of many tribal groups.

means abandoning agriculture as a source of living. More complete definitions of these terms as well as of *agricultural population* are given in Annex I. It is important to note that the first three strategies are within the domain of agricultural strategies, whereas the latter two are outside of the agriculture sector, but could still involve it. From an AIDS perspective, the first three strategies aim at reducing the vulnerability of the farm-household, whereas the last two fuel mobility systems which can be related to the spread of HIV.

In order to read the table, each row is devoted to a farming system. For example, if one takes the Sub-Saharan tree crop system, 4 out of 10 experts believe the best strategy for poverty reduction is through intensification and only 1 expert believes that the preferable strategy is exit of agriculture. In contrast, for the East Asia highland extensive mixed system, no expert considers intensification a recommended strategy and 5 experts out of 10 think that exit of agriculture is an effective strategy to improve farmers livelihoods. Such considerations are very important in order to establish successful dialogue and partnerships between the AIDS and the agriculture sectors and institutions.

Some further remarks follow. Strategies such as *intensification* and *diversification* have very important labour dimensions and a role for LSTs. *Increased farm size* is clearly difficult for farm-households facing a shortage of labour and without considerable assets to invest in machinery. Furthermore, it is not a strategy for most Asian farming systems where there is a shortage of land. One might find out, however, that in Africa, some farm-households which are not affected by HIV/AIDS find themselves in a favourable position and take the opportunity of others' need to sell assets to increase their own holdings: history shows that epidemics are often opportunities for a minority. In the examples chosen and presented in Table 3, one will note the contrast between the potential for intensification and for diversification in Sub-Saharan Africa and in East Asia²⁹: LSTs need to take such factors into account.

Clearly, in the opinion of experts consulted, farming alone will not bring the solution to poverty and mixing it with other sources of income is often necessary. This means building migration into the mode of life of MHH with the risks (HIV infection) and opportunities (cash to invest in intensification or diversification and for school fees, etc.) that go with it. Increased off-farm income for FHH will often only be possible through sex work, and in fact studies show that widows and daughters often are involved in such an activity. One should explore alternatives through training in skills in demand or niche markets for highly valued products such as traditional, specialty or organic commodities that have a demand in cities where farmers' migrants live – thus providing a market “connectivity” with a given rural area.

Finally, when the experts see no other possibility, an exit from agriculture appears to be the only solution. When one looks back at Figure 2 on the processes through which farm-households can go through, one can see that prime candidates are the most vulnerable households towards the right of the Figure 2 where some members can migrate to the towns, or all might do so at the dissolution of the household.

²⁹ Diversification, through temporal and spatial rotations and associations – crop, trees, livestock, fish – maximizes farming system efficiency. Creating a balanced energy/nutrient flow results in ecological services (e.g. nutrient cycling, predation, pollination) that save on production costs, both in terms of external inputs and labour. Diversification also spreads risk by maintaining several species and varieties of plants and animals (if one crop fails, others will succeed), stabilizing yields over the long-term, promoting diet diversity and maximizing returns under low levels of technology and limited resources. Where the introduction of a new productive element is feasible – such as fish in rice fields or vegetables under trees – total food production increases.

The argument that rural exodus is unavoidable and provides cheap labour for urban development overlooks that in the age of HIV/AIDS the way in which the future is discounted can result in a time bomb which reduces or even destroys the economic and general advances made in the short and medium term. The cost of introducing LSTs should be evaluated, not just in the short term, but over the long term.

In the last column of Table 3, we have included estimates of the agricultural population involved in each type of farming system. The numbers can vary enormously, ranging from a few million to hundreds of million. As has been pointed out, the successful introduction of LSTs generally requires various forms of outside support and these population estimates give an idea of the scale of resources required depending on the size of the population concerned by the farming system type and the level of HIV prevalence. It is clear that addressing such issues requires mobilizing beyond the strict agriculture sector and also establishing public and private partnerships.

IV. CONCLUSIONS AND RECOMMENDATIONS

As shown in this paper, the role of LSTs in rural areas affected by HIV/AIDS has many dimensions and aspects which can only be hinted at in this bird's eye view of the issues. LSTs raise very complex issues which have been hardly explored, but which require urgent study and experiment in concrete field situations in view of the crucial role they can play in building the resilience of farm-households and mitigating some of the impacts of HIV/AIDS on the food security and survival of the affected farm-households.

The challenge of HIV/AIDS to food security is multiform, in particular as it impacts on labour availability and effectiveness of the farm-household and, consequently on the entire livelihood of its members thus threatening its continuation and very survival. In the farm-households affected by HIV/AIDS, through sickness and death of their members, the nature of the farm-household changes and with each change, becomes more vulnerable and less of a production unit. From this perspective, HIV prevention takes on an added urgency. One of the important policy implications for AIDS programmes which have so far focused mainly on individuals and the groups they belong to, is that it is also necessary to consider individuals within their context: strategies need to go beyond the individual to also target their environment, in this case, the farm-household and the farming system and therefore *partnerships* by AIDS programmes with the agriculture sector are necessary. From the agriculture sector side, it can no longer give priority exclusively to production while ignoring the fate of the producers as this will ultimately undermine production itself. The agriculture sector can thus benefit from a partnership with AIDS programmes in order to design and implement agriculture and rural development strategies which strengthen the resilience of farm-households, farming communities and farming systems as well as contributing to maintaining agricultural production.

It is also shown that the magnitude of the challenge of HIV/AIDS depends on the *type of farming system* the farm-household belongs to and its own resilience and potential for progress. Introducing LSTs requires a two-track strategy: i) by type of farming system and, ii) by type of farm-household. In view of the fact that gender division of labour is so intimately linked to the functioning of the farm-household and the farming system, special attention to *gender* issues is necessary when introducing LSTs.

However, as highlighted repeatedly, all is not bleak and LSTs can contribute significantly in *building resilience* at various levels, all of which contribute to keeping in check the presently on-going or potential future impacts of HIV/AIDS. The fact that strategies have to be tailored to each type of farming situation and household makes it difficult and resource intensive (human and financial wise). This needs to be weighed against the fact that the longer term cost of inaction can be infinitely greater. Ultimately, are farmers and their families just factors of production or does their value as human beings have also to be taken into account in agriculture and other sectors' decision-making? The agriculture sector has to build partnerships with other sectors in order to respond as effectively as possible.

In view of the uncertain future of a number of farming systems, the HIV/AIDS challenge should also be seen as an *opportunity* to rethink agriculture, not just its role in production, but also its role in the environment, in livelihoods and, more broadly as a *culture*. It is fortunate that agriculture has developed in the last decades a number of new approaches which, properly and appropriately introduced (they include also LSTs), could make a significant contribution both to rural development and to controlling HIV/AIDS through general resilience building of farm-households and mitigation of HIV/AIDS impacts. Finally, because LSTs can contribute perhaps more in the area of building resilience of farming systems and of farm-households, than in mitigation, their early introduction is of great importance.

ANNEX I

Definitions of column headings of Table 3

Intensification is defined in this book as increased physical or financial productivity of existing patterns of production; including food and cash crops, livestock and other productive activities. Although intensification is frequently associated with increased yields as a result of greater use of external inputs, it may also arise from improved varieties and breeds, utilisation of unused resources, improved labour productivity, and better farm management - for example improved irrigation practices or better pest control.

Diversification is defined as an adjustment to the farm enterprise pattern in order to increase farm income, or to reduce income variability. It exploits new market opportunities or existing market niches. Diversification may take the form of completely new enterprises, or may simply involve the expansion of existing, high value, enterprises. The addition or expansion of enterprises refers not only to production, but also to on-farm processing and other farm-based, income generating activity.

Some households escape poverty by *expanding farm size* - in this context size refers to managed rather than to owned resources. Beneficiaries of land reform are the most obvious examples of this source of poverty reduction. Increased farm size may also arise through incursion into previously non-agricultural areas, such as forest - often termed expansion of the agricultural frontier. Although this option is not available within many systems, it is of relevance particularly in parts of Latin America and Sub-Saharan Africa. Increasingly, however, such 'new lands are marginal for agricultural purposes, and may not offer sustainable pathways to poverty reduction.

Off-farm income represents an important source of livelihood for many poor farmers. Seasonal migration has been one traditional household strategy for escaping poverty and remittances are often invested in land or livestock purchases. In locations where there is a vigorous off-farm economy, many poor households augment their incomes with part-time or full-time off-farm employment. Where opportunities for improved livelihoods are perceived, a proportion of farm households will abandon their land altogether, and move into other farming systems, or into off-farm occupations in rural or urban locations. This means of escaping agricultural poverty is referred to as *exit from agriculture*.

[NB] The assessment for each farming system is based on the judgement of groups of experts knowledgeable about each particular region.

Agricultural population The agricultural population is defined as all persons depending for their livelihood on agriculture, hunting, fishing or forestry. The estimate comprises all persons actively engaged in agriculture and their non-working dependants.

Source: John Dixon, Aidan Gulliver with David Gibbon, *Farming Systems and Poverty – Improving farmers' livelihoods in a changing world*, FAO and World Bank, 2001, pages 14 and 411.