LABOUR SAVING TECHNOLOGIES AND PRACTICES FOR FARMING AND HOUSEHOLD ACTIVITIES IN EASTERN AND SOUTHERN AFRICA

Labour Constraints and the Impact of HIV/AIDS on Rural Livelihoods in Bondo and Busia Districts, Western Kenya

A Joint Study By:
IFAD (Gender Strengthening Programme of Eastern and Southern Africa Division)
FAO (Agricultural and Food Engineering Technologies Service of Agricultural Support Systems Division)

Financed by the Government of Japan
Labour Constraints and the Impact of HIV/AIDS on Rural Livelihoods in Bondo and Busia Districts Western Kenya

2003

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A Joint Study By:
IFAD (Gender Strengthening Programme of Eastern and Southern Africa Division)
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Blacksmith, Bondo town
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Fisherwoman cooking on the three stone fire, Uhasi, Bondo District

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Foreword

Today, the challenge of addressing labour constraints in rural households has become even more urgent in many countries in sub-Saharan Africa. The past decade has seen a significant reduction in the availability of farm power. Government operated tractor hire schemes have floundered under the impact of structural adjustment and in many areas the stock of draught animals has been decimated by disease. The continued availability of sufficient farm power, especially ‘human muscle power’, is further depleted by a lack of interest in farming among the youth, who are seeking alternative employment in urban areas. The productivity of the remaining labour-force is compromised by a lack of physical energy and poor quality tools.

The situation of many households moves from one of difficulty to disaster when a key family member loses the ability to contribute normal levels of ‘human muscle power’ to livelihood activities as a result of HIV/AIDS. In Bondo and Busia Districts of western Kenya, where the study took place, many households were already facing farm power shortages prior to the HIV/AIDS epidemic. With the impact of HIV/AIDS, the decimation of the labour force is accelerating and the eventual collapse of many households’ human asset base is almost inevitable.

Solutions are urgently needed to address the current labour crisis which might include innovative technology interventions. These will have to be combined with targeted field programmes that will suit the acute emergency situation which many rural communities are facing today. The real challenge will be to reach the most vulnerable households (such as those headed by orphans, grandparents and women), who require immediate assistance. A wide range of technology options could help address some of the labour constraints: the promotion of energy saving stoves to reduce the daily task of firewood collection; promotion of donkeys especially for women and orphans to ease the burden of transporting drinking water and other goods; the introduction of water harvesting techniques and agricultural practices that are less labour intensive such as lighter and better quality hand tools, the management of soil cover in order to suppress weeds, or introducing crops that are less labour intensive. All these technology interventions will require adequate training, technical assistance and a supporting infrastructure.

This working paper reports on one component of a joint IFAD/FAO study, funded by the Government of Japan, titled ‘Improving Women’s Access to Labour Saving Technologies and Practices in Sub-Saharan Africa’. The study was instigated by the Eastern and Southern Africa Division of the International Fund for Agricultural Development (IFAD) and follows a previous joint IFAD/FAO study in 1997 focusing on the agricultural implements used by women farmers in sub-Saharan Africa. Both IFAD and the Agricultural and Food Engineering Technology Service (AGST) of FAO are increasingly concerned about the shrinking farm power and labour base in rural Africa and this opportunity to pool expertise and collaborate in a major study of this nature has been timely.

Some of the study results and recommendations have already been taken up by collaborating field projects operating in the study area, the FAO Technical Cooperation Programme ‘Reducing Chronic Hunger in Bondo District’ and the IFAD-TAG supported FAO Farmer Field School Project. Farmer field schools and farmer life schools have started to specifically focus on options for introducing labour saving farming and household practices.

This report invites stakeholders and policy makers working in agricultural and rural development at various levels to take a closer look at the current day-to-day living conditions of poor vulnerable farmers in western Kenya. It does not attempt to draw general conclusions for sub-Saharan Africa. Rather, it illustrates the difficulties of, and threats to, rural livelihoods. The HIV/AIDS pandemic in rural areas is adding another dimension to the already precarious living conditions under which many farming families live.

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LIST OF ABBREVIATIONS

AGS  Agricultural Support Systems Division
AGST  Agricultural and Food Engineering Technologies Service
CA  Conservation Agriculture
DALEO  District Agriculture and Livestock Extension Officer
DAP  Draught Animal Power
FFS  Farmer Field School
FHH  Female-Headed Household
FITCA  Farming in Tsetse Controlled Areas (Kenya)
FTC  Farmers’ Training Centre
HH  Household
IGA  Income Generating Activity
ITDG  Intermediate Technology Development Group
KARI  Kenya Agricultural Research Institute
KENDAT  Kenya Network for Draught Animal Technology
KCTI  Kenya Conservation Tillage Initiative
KICK  Kenya Innovative Centre, Kisumu
MOARD  Ministry of Agriculture and Rural Development
NALEP  National Agriculture and Livestock Extension Programme
NARL  National Agricultural Research Laboratories
NEPAD  New Partnership for Africa’s Development
OHH  Orphan-Headed Household
RTDC  Rural Technology Development Centre
RTDU  Rural Technology Development Unit
RWH  Rainwater harvesting
SSA  Sub-Saharan Africa
SDWP  Population and Development Service
SWARRA  Umbrella organisation for five communities in Bondo district (Sangala, Wang’iot, Siger, Rambira and Rambugu)
TAG  Technical Assistance Grant
TCP  Technical Cooperation Programme

UNITS OF MEASUREMENT

1 acre = 0.41 ha
1 ha = 2.47 acres
Currency: in mid 2002: US$ 1 = Ksh 77
EXECUTIVE SUMMARY

At the 2002 World Food Summit (Five Years Later) it was acknowledged that malnutrition is still omnipresent in many parts of the developing world and the need to address issues of agricultural production and food security is as urgent as ever. A recent study by FAO’s Agricultural and Food Engineering Technologies Service projected that humans and draught animals will continue to be the main sources of farm power for the foreseeable future. Thus hand power is critical within the production process, both in terms of availability and productivity. However, both variables are compromised through poor nutrition; illness and death; competing claims on time for labour intensive household tasks; and the drift away from the land in search of alternatives to the grind of subsistence agriculture.

Purpose of study

This report is one component of a joint IFAD/FAO study, funded by the Government of Japan, entitled ‘Improving Women’s Access to Labour Saving Technologies and Practices in Sub-Saharan Africa’. The purpose of the overall study is threefold:

• to identify labour/power shortages in rural communities and households (in particular due the effects of HIV/AIDS) and existing coping strategies;
• to identify how labour saving technologies and practices can assist in overcoming these shortages; and
• to identify the key factors which need to be in place in order to improve the adoption and sustained use of labour saving technologies and practices by poor rural women.

This document reports on the findings from the first in-country field study held in Kenya from 20 May to 8 June 2002. The study was conducted in four communities from two districts, Bondo and Busia, in western Kenya where issues concerning the availability and productivity of labour are highly topical. It is estimated that one third of adults are infected with HIV/AIDS but this figure may be as high as 40 to 50% in more vulnerable communities living along the lakeshore or in urban centres. The seriousness of the impact of HIV/AIDS on livelihoods in the study area is captured in Bondo District Development Plan (Ministry of Finance and Planning, 2001) which states:

‘AIDS is not just a serious threat to our social and economic development, it is a real threat to our existence. It has reduced many families to the status of beggars. No family remains untouched by the suffering and death caused by HIV/AIDS.’

Nature of labour constraints

Land preparation (digging) and weeding are generally ranked by women and men as their two most onerous activities. Men also cite other productive activities, such as cattle herding and labouring, amongst their most time consuming tasks whilst women identify a range of household activities which take place on a daily basis, such as fetching water and firewood, looking for vegetables for the next meal, and cooking.

The principal causes of labour constraints arising in agriculture are threefold: the reliance on hand power; the reduction in the productivity of the labour force; and the reduction in labour available in the household to undertake farm work. Today humans are the principal source of power for almost all farm operations in Bondo and Busia districts. Draught animals and tractors used to make significant contributions to land preparation activities but the livestock population has been decimated in recent years by disease, and government-operated tractor hire services – never widely available - are in a state of collapse. Productivity is invariably low due to the limited range and poor quality of hand tools used by farmers, and people’s lack of physical energy. The workforce is depleted by: the priority placed on children attending school; a lack of interest in farming among the youth and seeking alternative employment off-farm; and the death of household members. Those remaining have less time available for farm work due to competing claims on their time, such as performing regular (usually daily) time consuming tasks for the household; caring for the sick and attending funerals; and hiring out family labour in order to meet immediate household needs.
**HIV/AIDS as a root cause of labour shortage and deteriorating agricultural production**

The evidence from the fieldwork suggests that many households in the study communities were already facing power shortages prior to the HIV/AIDS epidemic. The impact of the latter has been to accentuate the shortages, changing the composition of the labour force and forcing households to adopt short term coping strategies which are often irreversible. Thus HIV/AIDS now plays a pivotal role in the emerging farm power crisis. Many of the labour constraints are more acute in households affected by HIV/AIDS. Today, female-headed households (FHHs) typically account for 15 – 30% of all households in a community, and other types of vulnerable households, such as those headed by single males (MHH) without wives, and grandparent- and orphan-headed households, account for a further 10 – 15%. During the illness and death of key household members, households invariably experience a loss of labour and skills, a loss of income, and the reduction and collapse of the asset base (particularly after the death of husbands).

**Effects of labour constraints**

Amongst the most resource poor households, usually headed by orphans or grandparents, there are barely sufficient hoes for each household member and family labour is usually the sole source of power. Family labour is also very important in polygamous households where there is a large pool of family members. Whilst some FHHs hire oxen if they have the means to pay for the service, many turn to labour groups as a means of augmenting the family labour base after their husband’s death. Nevertheless, a significant proportion of married households and MHHs without wives use draught animal power, sometimes working together in order to overcome the decimation of their herd.

Farm power shortages at the household level have a dramatic impact on agricultural production and household food security. Land preparation using a hoe is very labourious and time consuming. Weeding is a critical activity and a major determinant of final yields. Many households respond to their shortage of farm power by scaling down their activities, reducing the area under cultivation (by up to 50%) and growing a limited range of crops. They struggle to keep pace with the seasonal calendar which results in taking short cuts in one season, with adverse knock-on effects in the next. Food security quickly decreases from an average of eight months food self sufficiency in married households to around four months in FHHs and MHHs without wives. Many grandparent- and orphan-headed households achieve at best only two months food self sufficiency from their own resources and are dependent on food handouts and the goodwill of their neighbours and relatives in order to survive.

**Initiatives to overcome power constraints**

Various initiatives are currently being undertaken in Bondo and Busia districts to help local communities overcome some of their power constraints. Access to farm power is being promoted by ‘Farming in Tsetse Controlled Areas’ (FITCA), a major initiative to support the use of DAP, and new tractor hire service providers are emerging in the local government, NGO and private sectors. An alternative to promoting access to additional power inputs is to reduce the demand for power through conservation agriculture. Working through a public-private partnership with FITCA, government and Monsanto, farmers and extension staff have been trained and demonstration sites established in Bondo and Busia districts. The Home Economics service of MOARD actively disseminates information about fuel efficient stoves and the Farmers’ Training Centre in Busia demonstrates a range of post harvest and processing technologies. A few of the HIV/AIDS-related initiatives support the adoption of technologies to improve the livelihoods of affected households.

**Options to overcome labour constraints**

The various ways in which the priority labour constraints in Bondo and Busia districts can be addressed may be grouped hierarchically representing the degree of change they introduce into the farming and household system.
Level 1: Working within the existing system and resource base
- make existing labour more productive: through better health and nutrition
- make existing tasks easier in order to reduce the demand for labour

Level 2: Drawing additional resources into the existing system
- use additional power sources
- extend the use of existing power sources
- use fuel efficient stoves and simple food processing equipment

Level 3: Developing a new system
- release labour from other time-consuming tasks to concentrate on specific activities
- substitute less labour intensive activities for labour intensive activities
- introduce new power sources for household use

Many of these technologies and practices have moved beyond the research stage and are already in the public domain. Hence, the need is to facilitate the adoption of current best practice through understanding the barriers to adoption. In view of the severity of the crisis arising largely from the impact of HIV/AIDS, the recommendations distinguish between those which are relevant for households with their labour and resource base broadly intact, and those for households with a severely depleted resource base.

Barriers to adoption and recommendation domains for households with resource base largely intact

The majority of households have yet to experience the full devastating impact of HIV/AIDS in terms of the death of a key household member and depletion of the resource base. However, given the high prevalence rates, it is inevitable that many will face these challenges in the near future. The extent to which these ‘intact’ households can adopt labour saving practices and technologies before any change in their household resource base, may help them not only to overcome existing labour constraints but weather the ensuing labour crisis better. However, they face seven principal barriers to adoption: lack of knowledge, limited choice, poverty and lack of purchasing power, time constraints, weak bargaining position, attitudes and tradition. Three recommendation domains have been identified: to increase farmers’ exposure to new ideas and access to information; to develop appropriate skills and attitudes for the sustained use of labour saving technologies and practices; and to increase farmers’ access to relevant technologies.

Barriers to adoption and recommendations for vulnerable households

Households headed by women, orphans and single men will become increasingly common over the next few years and their needs will have to be urgently addressed in order for this population not to be reduced to begging and living off charity. These groups urgently need access to labour saving technologies and practices. However, their barriers to adoption are so severe that they require very different assistance to those households whose resource base is intact. Three recommendation domains have been identified. They all rely on external financing in the recognition of the fact that these households have neither the spare cash to purchase additional inputs nor labour to invest in adopting new practices. They are:

- to meet the most pressing time constraints with immediate solutions by supporting labour brigades; providing grants to support the adoption of technologies which immediately ease the workload of household members; and actions to prolong the active life of people living with HIV/AIDS;
- to develop skills through the formation of farmer field schools for vulnerable groups through developing the capacity of facilitators and service providers to identify vulnerable groups and obstacles which hinder their participation in group activities; facilitating group formation amongst vulnerable groups; identifying and addressing the most urgent needs of vulnerable groups; developing new skills to replace those which have been lost; supporting the groups in proposal writing to secure funds; and build partnerships with existing CBOs/NGOs to learn from their experiences; and
to invest in activities which will yield labour saving benefits in the medium term through providing grants to support medium term investments and mechanise crucial farm operations.

Follow-up activities for FAO and IFAD

Within the scope of the Bondo TCP and the IFAD-supported Farmer Field Schools (FFS) operating in western Kenya, the activities listed below provide an immediate opportunity for follow-up to the field study: developing FFS curriculum on the themes of land preparation and weed management, the use of DAP for farm work and transport, and labour saving technologies and practices for household activities. Curriculum could also be developed for artisans to develop their skills in the manufacture, servicing and repairs of equipment for draught animals.

Three areas of research have been identified: AGS to develop strategies to increase farm power availability through establishing the viability of private DAP or tractor hire services; identifying mechanisms and encouraging small entrepreneurs to set up DAP/tractor hire services; undertaking detailed studies of the dynamics of HIV/AIDS and its impact on different types of households; an economic analysis of labour saving technologies and practices in terms of their productivity, profitability and other factors influencing their adoption and sustained use particularly amongst more vulnerable households.

Conclusion

It should be possible to alleviate some of the most pressing problems facing the farming community arising from labour constraints through the identification, dissemination and support of appropriate labour saving technologies and practices. With the growing crisis in changing household composition (triggered and exacerbated by HIV/AIDS), special attention has to be paid to addressing the particular needs of vulnerable groups. In particular, emphasis should be placed on developing their human and social capital along with the selective use of grants to enable them to adopt specific labour saving technologies.
1. INTRODUCTION

1.1 Background

IFAD’s Gender Strengthening Programme in Southern and Eastern Africa secured funding from the Government of Japan to undertake a study entitled ‘Improving Women’s Access to Labour Saving Technologies and Practices in Sub-Saharan Africa’. The study is being undertaken jointly between the Gender Programme of IFAD and FAO’s Agricultural and Food Engineering Technologies Service. The study follows on from an earlier collaborative venture which focused on agricultural implements used by women farmers in sub-Saharan Africa (IFAD/FAO, 1997).

The purpose of the overall study is threefold:

• to identify labour/power shortages arising in rural communities and households (in particular due the effects of HIV/AIDS) and their existing coping strategies;
• to identify how labour saving technologies and practices can assist in overcoming these shortages; and
• to identify the key factors which need to be in place in order to improve the adoption and sustained use of labour saving technologies and practices by poor rural women.

The overall study has two components: a distance survey of IFAD-supported and FAO projects and programmes in sub-Saharan Africa; and in-country studies to be conducted in Kenya and Tanzania. This working paper reports on the findings from the first in-country study held in Kenya from 20 May to 8 June 2002. The full list of participants in the Kenyan study team is presented in Appendix 1.

1.2 Urgent Need to Address Labour Constraints in Sub-Saharan Africa

At the 2002 World Food Summit (Five Years Later) it was acknowledged that malnutrition is still omnipresent throughout many parts of the developing world. Hence the need to address issues of agricultural production and food security is as urgent as ever. The Comprehensive Africa Agriculture Development Programme of NEPAD has further renewed interest in the crucial role of developing the agricultural sector specifically within Africa. The extent to which these initiatives are successful in stimulating agricultural production (be it from area expansion, an increase in cropping intensity or an increase in yields) will require additional power, if not for technology application then for handling and processing increased volumes. Similarly, land improvements, soil conservation and water harvesting techniques frequently place additional demands on the power resource.

At present it is estimated that 65% of land in sub-Saharan Africa (SSA) is prepared by hand power. Draught animal traction plays significant roles within certain farming systems, such as the maize mixed cereal systems of eastern and southern Africa (preparing 25% of land within SSA). Tractors only make a minor contribution to land preparation at present (estimated at 10% of harvested area). A recent study by FAO’s Agricultural and Food Engineering Technologies Service (FAO, 2003) projected that there will be few significant changes in composition of farm power inputs in many countries within sub-Saharan Africa. Humans and draught animals will continue to be the main sources of power for the foreseeable future. Economic growth coupled with peace and political stability (the preconditions for supporting self-sustaining mechanisation) is often absent.

Thus human power is a critical element within the production process, both in terms of its availability and productivity. However, both variables are compromised through poor nutrition, illness and death, lack of interest in the grind of subsistence agriculture, competing claims on

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1 The study team consisted of Clare Bishop-Sambrook (agricultural economist and team leader, IFAD consultant), Josef Kienzle (agricultural engineer and study coordinator, FAO AGST), Maren Lieberum (nutritionist and HIV/AIDS specialist, FAO consultant with Population and Development Service), Hottensiah Mwangi (weed scientist, KARI), Pascal Kaumbutho (agricultural engineer and draught animal technology specialist, KENDAT) and Louis Othieno (small scale manufacturing specialist, ITDG East Africa). The report was written by Clare Bishop-Sambrook, drawing on thematic papers prepared by the team members.
time for labour intensive household tasks, and the drift away from the land in search of alternative livelihoods. Households which are reliant on human power are extremely vulnerable to the loss of labour. The impact of HIV/AIDS will have a devastating impact on the rural livelihoods in many parts of this region (FAO, 1995), where losses will typically account for at least 10% of the agricultural workforce and, in at least five countries, more than 20%.

1.3 Findings from the Distance Survey

The purpose of the distance survey was to set the study about labour constraints in the broadest context. Information was gathered from a wide range of IFAD and FAO-supported projects and programmes in sub-Saharan Africa, covering workloads for women and men, the use of tools and equipment, labour and power constraints at the household level, their causes and effects, and the adoption and use of labour saving technologies and practices. Thirty six completed questionnaires were completed by experienced project staff from 23 projects representing a total of 13 countries.

The general impression provided by the respondents is one of decreasing availability of labour in the household for farming and other activities. Three principal causes are noted:

- firstly, ill health and death (cited by over 80% of the respondents) usually due to HIV/AIDS;
- secondly, rural-urban migration in search of employment (cited by 61% of respondents);
- thirdly, education (44% of respondents); the commitment to pursue schooling, particularly at primary level, draws young people away from farm work.

Each of these hits specific segments of the population: education – the young; migration – the able bodied and usually male; HIV/AIDS – people in their economic prime. The resultant agricultural labour force becomes increasingly characterised by the elderly, female-headed households, and the very young (including orphans). Moreover, the loss of human power is often compounded by the reduced availability of other power sources, such as the loss of draught animals and the closure (or increasing expense) of tractor hire services. The conditions arising from these labour shortages, through their effects on agricultural production, emphasise the daily grind and vulnerability of subsistence agriculture. The spiral of decline arising from farm power shortages contributes to food insecurity (arising from untimely farm operations and an inability to cultivate sufficient area), malnutrition and poor health, and a lack of disposable income. This deteriorating situation acts as a further catalyst to rural-urban migration and contributes to social instability due to depression, frustration and the breakup of families.

Households and communities use various strategies to overcome some of the labour and power shortages. Households which are better off or have access to non-farm sources of income or remittances, hire additional power (particularly labour) to assist with key farm operations. Many households circumvent the need for cash payment by working together in informal groups and exchanging labour, or making the payment in kind. Households access labour saving technologies (Box 1.1) through borrowing from neighbours, sharing with others, or joining groups. Some households buy cheap quality tools or use credit to purchase new tools. Many households have modified their traditional practices to minimise power requirements for land preparation and livestock rearing.

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2 It would be misleading, however, to suggest that the movement of power is always away from agriculture. In some countries the traditional flow of migration from rural areas is being reversed by the return of retrenched employees or stemmed at source by the lack of employment opportunities. Some areas have experienced improved access to alternative sources of power, such as animal traction, tractor hire schemes, power tillers, engine driven mills, treadle or engine driven pumps, rural electrification, rural transport and solar power.
Box 1.1: Labour Saving Technologies and Practices

- tools and equipment which reduce the drudgery and/or improve the efficiency of performing various farming or household activities, such as using draught animals for land preparation and rural transport, cooking on fuel efficient stoves, or harvesting roofwater for domestic purposes
- other potentially labour saving inputs, such as herbicides
- labour saving practices, for example growing crops which require less labour than traditional crops, practicing minimum tillage, intercropping leguminous cover crops to suppress weeds, or planting woodlots

1.4 Purpose of Kenyan Study

The fieldwork in Kenya complements the distance survey with an in-depth study of labour constraints in four farming communities which are particularly vulnerable to farm power shortages. The research objectives are fourfold:

- to identify the principal labour and power constraints faced by various groups within the community and gender-specific aspects of those constraints;
- to examine the causes of the constraints, their impacts on livelihood systems, coping strategies adopted by vulnerable households;
- to identify labour saving technologies and practices which may help overcome some of these constraints and, in particular, help vulnerable households cope better with loss of labour; and
- to review the activities of the local manufacturing, retail and government sectors in technology development and dissemination.

The findings reported in this document are based on data collected in four communities in western Kenya using Rapid Appraisal methods. They are indicative of key issues on the ground, which provide the basis for identifying potential ways forward for addressing labour constraints.

1.5 Rationale for Site Selection

Issues concerning the availability and productivity of labour used in farming and in the home, are highly topical in Nyanza and Western Provinces of Kenya. In a country where the Ministry of Health reports that, on average, 36 people die each hour due to HIV/AIDS-related illnesses, these provinces have some of the highest rates of incidence of the disease in Kenya. It is estimated that one third of adults are infected but this figure may be as high as 40 to 50% in more vulnerable communities living along the lakeshore or in urban centres (FAO, 2001). This is in part due to a highly mobile and transitory population as a result of the location: adjacent to the Ugandan border and bisected by a major transport route; and adjoining Lake Victoria with a major port. Some of the cultural practices of the Luo exacerbate the spread of the disease. The seriousness of the impact of HIV/AIDS on livelihoods in the study area is captured in Bondo District Development Plan (Ministry of Finance and Planning, 2001) which states:

‘AIDS is not just a serious threat to our social and economic development, it is a real threat to our existence. It has reduced many families to the status of beggars. No family remains untouched by the suffering and death caused by HIV/AIDS.’ (page 21).

The area is also characterised by the migration of the young and able, and the in-flow of older people returning home on retirement or retrenchment, and others returning home when sick. Draught animals, a traditional means of opening up land in this area (Kaumbutho, 2000), have been decimated by disease, and government-operated tractor hire services – never widely available – are in a state of collapse.

The selection of these areas is also relevant in the context of FAO and IFAD-supported activities in the area. A Technical Cooperation Programme (TCP) ‘Reducing Chronic Hunger in Bondo District’ has recently been established by FAO in Bondo district whilst the IFAD-TAG Farmer Field Schools (FFS) have been operating successfully for over two years in Busia...
district. Not only did these projects provide entry points into the community but also made the study highly focused on practical recommendations with the opportunity for immediate follow-up through FFS and TCP.

The study is also timely with regard to IFAD initiatives in the country. Labour saving technologies, both for smallholder farmers and female headed households, are amongst the priority needs for IFAD’s target group of poor and vulnerable households.

1.6 Structure of Report

Chapter 2 presents an overview of Bondo and Busia districts, the field sites and the survey methods. The main labour constraints facing the community, their causes and effects, and ways in which households adjust to power constraints are discussed in chapter 3. Chapter 4 focuses on the vulnerability of households arising from the impact of HIV/AIDS, in particular the role of HIV/AIDS as a root cause of labour shortages and deteriorating agricultural production.

The final two chapters focus on initiatives to help communities overcome some of their power constraints. Chapter 5 reviews actions that are currently underway whilst chapter 6 identifies further opportunities for reducing the burden of labour constraints and farm power shortages on the most vulnerable households.

1.7 Acknowledgements

The study team is grateful to the Government of Japan for financial support to undertake this research. The study team would also like to thank the administrations in Bondo and Busia districts for their full cooperation throughout the study and particularly those staff who participated actively in the fieldwork. The interest shown in the study by the four study communities was also greatly appreciated.

Thanks are also due to the FAO staff in the Nairobi office for their support as well as IFAD staff in Rome. Special thanks are due to Lawrence Clarke of FAO AGST, who had a key role in the study preparations as well as supporting the field work and report writing. The substantive editorial comments provided by Geoffrey C. Mrema, Director of the Agricultural Support Systems Division (AGS) of FAO, as well as the comments by John Dixon, Agricultural Management, Marketing and Finance Service (AGSF) are gratefully acknowledged.
2. **Socio-Economic and Agricultural Characteristics of Bondo and Busia Districts**

This section sets the context for the fieldwork, providing an overview of the socioeconomic and agricultural characteristics of the study area and a review of the fieldwork methods.

2.1 District Characteristics

Bondo and Busia districts are among the poorest in Kenya with around half of their populations living below the poverty line (Table 2.1). Busia has an estimated per capita annual income of US$ 170; the national average is US$ 350 (UNDP, 2002). The population is characterised by being young with levels of literacy well below the national average of 80%. Life expectancy is on a par with the national average of 51 years. Out-migration is high, particularly among young men. In comparison to the national average infection rate of 14%, HIV/AIDS infection rates in these districts are among the highest in the country (FAO, 2001).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Bondo</th>
<th>Busia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>270,000</td>
<td>390,000 (1999 Census)</td>
</tr>
<tr>
<td>Work force (aged 15-64) as % total population</td>
<td>44%</td>
<td>Data not available</td>
</tr>
<tr>
<td>Population aged 20 years and below</td>
<td>58%</td>
<td>Data not available</td>
</tr>
<tr>
<td>Population growth rate</td>
<td>1.8% pa</td>
<td>2.8% pa</td>
</tr>
<tr>
<td>Life expectancy by sex</td>
<td>Women: 55 years, Men: 48 years</td>
<td>Women: 53 years, Men: 53 years</td>
</tr>
<tr>
<td>Estimate of per capita income</td>
<td>Data not available</td>
<td>Ksh 13,000 pa (US$ 170)</td>
</tr>
<tr>
<td>Percentage of population below poverty line</td>
<td>47%</td>
<td>60%</td>
</tr>
<tr>
<td>Literacy rates</td>
<td>58%</td>
<td>Women: 55%, Men: 77%</td>
</tr>
<tr>
<td>Incidence of HIV/AIDS</td>
<td>29%</td>
<td>33%</td>
</tr>
<tr>
<td>Ethnic groups</td>
<td>Luo</td>
<td>Luhy and Teso</td>
</tr>
</tbody>
</table>

Sources: Bondo data: Ministry of Finance and Planning (2001)  
Busia data: District Commissioner’s Office

Agriculture is the backbone of the local economy. In Bondo over 80% of household incomes are earned from farming (crops and livestock) and fishing. The amount of arable land in use, however, represents less than half of the arable potential (Table 2.2). The farming is typical of the rainfed maize mixed farming system which predominates in east and southern Africa. Cotton was once an important cash crop but production has declined with the closure of local ginneries and the depressing effect of cheap imported secondhand clothes on cotton prices. Smallholder sugarcane production is significant in the northern part of Busia. Fishing is the preferred livelihood activity along the lakeshore but its full value is not realised at district level due to a lack of cold storage facilities.

Neither district is food secure, relying on food purchases from other areas. Indeed, the availability of cheap staple food from Uganda is seen to be a contributing factor disrupting agricultural activities in Busia. The development of the agricultural sector in Bondo plays a central role in Medium Term Expenditure Framework (2002 – 2008) to reduce the incidence of poverty and stimulate economic growth (Ministry of Finance, 2001). Measures include activities to raise farm productivity (especially labour productivity), reduce exposure to risks, diversify employment, increase incomes, and improve access to food.
Table 2.2: Agricultural Characteristics of Bondo and Busia Districts

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Bondo</th>
<th>Busia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude (masl)</td>
<td>1140 – 1350 masl</td>
<td>1300 masl</td>
</tr>
<tr>
<td>Rainfall (annual mm)</td>
<td>600 – 800 mm rising to 1600 mm on high land</td>
<td>Ranges from 900 mm near Lake Victoria to 1500 mm further north</td>
</tr>
<tr>
<td>Long rains</td>
<td>March – June</td>
<td>March – May</td>
</tr>
<tr>
<td>Short rains</td>
<td>September - November</td>
<td>August – December</td>
</tr>
<tr>
<td>Topography</td>
<td>Hills and undulating terrain in interior; moderately flat lands along lake shore</td>
<td>Undulating lands</td>
</tr>
<tr>
<td>Land</td>
<td>Total: 972 km²</td>
<td>Total: 1262 km²</td>
</tr>
<tr>
<td></td>
<td>Agricultural potential: 706 km²</td>
<td>Agricultural potential: 946 km²</td>
</tr>
<tr>
<td>Arable potential in use</td>
<td>30%</td>
<td>45%</td>
</tr>
<tr>
<td>Irrigated potential in use</td>
<td>Potential along lakeshore not utilised</td>
<td>Very little. Used to grow irrigated rice but scheme collapsed</td>
</tr>
<tr>
<td>Agro-ecological zones</td>
<td>2 agro-ecological zones</td>
<td>4 agro-ecological zones</td>
</tr>
<tr>
<td>Food crops (ranked in declining order of area)</td>
<td>Maize, sorghum, beans, cassava, sweet potatoes, green grams, finger millet</td>
<td>Maize, sorghum, beans, cassava, sweet potatoes, finger millet</td>
</tr>
<tr>
<td>Cash crops</td>
<td>Tomatoes, vegetables, groundnuts, cotton, sunflower</td>
<td>Northern part: sugarcane Southern part: cotton Others: groundnuts, horticulture, citrus</td>
</tr>
<tr>
<td>Livestock</td>
<td>Zebu cattle (99500 head), dairy cows (450 head), goats, sheep, poultry, donkeys (1300)</td>
<td>Zebu (120,000 head), exotic cattle (5000 head), sheep, goats, poultry, pigs, bee keeping</td>
</tr>
<tr>
<td>Population density</td>
<td>Average for district: 245/km²</td>
<td>Average for District: 347/km²</td>
</tr>
<tr>
<td></td>
<td>Rarieda: 319/km²</td>
<td>Funyula: 316/km²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nambale: 266/km²</td>
</tr>
<tr>
<td>Farming families (comprising several households per family)</td>
<td>38,600 farm families</td>
<td>62,000 farm families with an average of 4 – 5 households per farm family and 7 members per HH</td>
</tr>
<tr>
<td>Average area per farm family</td>
<td>4 ha (10 acres)</td>
<td>District: 1.6 ha (4 acres)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Funyula: 1.6 ha (4 acres)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nambale: 2.6 ha (6.5 acres)</td>
</tr>
</tbody>
</table>

Source: Bondo data: MOARD (2002) Busia data: DALEO’s Office

2.2 Field Site Characteristics

(i) Uhasi, Usigu division, Bondo district

Uhasi, lying 25 km to west of Bondo town (including 8 km on an unsealed road), is typical of the mixed fishing/farming communities located along Lake Victoria. Fishing is the predominant activity, with 75% of the households participating. The Luo have a preference for fishing which offers immediate returns and the possibility of high incomes in comparison with agriculture. The beaches attract a continual inflow of people: young men in pursuit of an easy cash income and women following the men. They live outside the traditional social structure and subsistence farming households, and drinking, casual sex, theft, HIV/AIDS and high death rates among young men are common.

Farming is predominantly at the subsistence level. Nearly all households plant local varieties of maize and sorghum, and rarely use fertilizer (although some use manure), despite low soil fertility. Maize yields are very low, realising 1 – 1.5 ton per ha compared to a potential of 7 tons/ha when following recommended agronomic practices for the ecological zone (KARI, 1996). This is the driest part of the district but there are opportunities for irrigated farming along the shoreline. The short rains are unreliable so farmers sometimes miss the second crop. The average size of holding is 2 ha (5 acres). Most of the land is prepared by hand, particularly on small plots by the lakeshore and where the ground is stony. Draught animals are used on larger plots although the number of oxen has been severely reduced by tsetse fly and tick related deaths. Among the agricultural problems noted during a recent PRA study (MOARD, 2001) undertaken by the DALEO’s office were: youths were idle; men were not active in agriculture; and ploughing was inadequate resulting in late planting and other late operations.
(ii) SWARRA, Rarieda division, Bondo district

Rarieda division is dominated by rolling grass plains, scattered with acacia trees. There are many fish landing beaches along the beaches so some farmers engage in fish trade. Rarieda has the highest population density in district at 319 persons per km².

SWARRA is an umbrella organisation for five communities in the division (Sangala, Wang’iot, Siger, Rambira and Rambugu), lying 9 km to the east of Bondo town (of which only 2 km is off the tarmac road). SWARRA, a self help group, was registered in 1999 to act as an information channel and focus for training for 19 women’s and youth groups in the area which are working to eradicate poverty, improve incomes and the welfare of the community.

(iii) Sibale, Funyula division, Busia district

The area visited lies 28 km to south east of Busia town (of which 13 km is on murram roads). As a result of high population density (316/km²), land has been brought into cultivation and is used more intensively than 20 years ago. The area per household is small (1.6 ha or 4 acres) and two crops are grown each year. Although it is estimated that 40% of households have cattle, there is no tradition of DAP use and most of the land is prepared by hand. Cotton production used to be an important cash crop in the drier areas near Lake Victoria.

(iv) Nandafubwa, Nambale division, Busia district

Nambale division is the least densely populated part of Busia, with the largest holdings per farm family (2.6 ha or 6 acres). Traditionally farmers used DAP extensively but nowadays it is very rare to find a household with a full set of four oxen. The survey community lies 30 km to the north east of Busia (8 km on murram roads). Many smallholder farmers hold contracts for sugarcane production with a sugar factory.

2.3 Fieldwork Methods

The study was conducted in two districts located in Nyanza and Western Provinces adjacent to the Ugandan border. Two contrasting communities were selected from each district. In Bondo, one community was actively engaged in fishing, as well as some farming activities (Uhasi village in Usigu division); the other focused entirely on farming and livestock rearing (SWARRA in Rarieda division). In Busia, both communities were fully involved in agriculture but were differentiated by the extent to which they made use of draught animal power. In Funyala division, although 40% households have cattle, DAP has not been widely used whilst in Nambale division DAP has been a traditional feature of the farming system. Both areas are characterised by low utilisation of arable potential: 30% in Bondo and 45% in Busia.

During the fieldwork, the local artisan, retail and distribution sectors were visited to determine the range, prices and quality of tools available locally and intra-sectoral linkages with the farming community. Meetings were also held with representatives of local government and NGOs to discuss recent changes in the local community and their initiatives to support rural development, in particular to address issues arising from HIV/AIDS. The list of organisations consulted during the fieldwork is presented in Appendix 2.

Three days were spent in each community. On the first two days, the community was divided into several sub-groups in order to capture information from diverse perspectives. The composition of sub-groups varied between communities but usually included community leaders (both women and men), separate groups of female and male farmers, separate groups of women heading households and married women, and members of organisations (both women and men). Extensive use was made of Rapid Appraisal methods for data collection (see Appendix 3).

The final day in each community was spent in plenary. A problem tree was used to demonstrate the principal causes of labour constraints in the community (as had been identified by the community) and their effects on food production and general wellbeing. This information was then used as a basis for identifying possible ways in which community could attempt to better cope with the loss of labour and overcome some of their labour constraints.
The discussion generally focused on five main themes: land preparation and weed management practices; an appraisal of hand tools; the use of draught animal power; fuel efficient stoves; and a review of organisations with view to increasing their relevance to, and the participation of, more vulnerable groups.

The relevance of the study from the community’s perspective is demonstrated by the attendance rates during the three days in each community. Typically 40 to 60 people attended community meetings each day, with many participating in the study on all three days (see Appendix 4). In total, there were 222 participant days in Bondo and 298 in Busia. Half of the participants were women and female-headed households were particularly well represented (accounting for over 40% of all women). It proved very difficult to meet with children from orphan-headed households, partly because they are few in number but also because they have a relatively low profile within a community.
3. THE NATURE OF LABOUR CONSTRAINTS IN RURAL COMMUNITIES

One of the core activities of the fieldwork was to establish the nature of labour constraints in each community, their causes and effects. This chapter reports on the consolidated findings from the four study communities. Further discussion about HIV/AIDS as one of the root causes of labour stress in farming households is presented in chapter 4.

3.1 Ranking of Labour Constraints

Women and men generally rank digging and weeding as their two most onerous activities (Table 3.1). Men also cite other productive activities, such as cattle herding and labouring, amongst their most time consuming tasks whilst women identify a range of household activities which take place on a daily basis, such as fetching water and firewood, looking for vegetables for the next meal and cooking. These patterns only deviate significantly in Uhasi, where fishing and fish marketing are important tasks for men and married women, as is caring for the sick.

<table>
<thead>
<tr>
<th>Community</th>
<th>Married women</th>
<th>FHHs</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. smoking/marketing fish</td>
<td>1. water and firewood collection</td>
<td>1. digging</td>
</tr>
<tr>
<td></td>
<td>2. cooking</td>
<td>2. weeding</td>
<td>2. fishing</td>
</tr>
<tr>
<td></td>
<td>3. washing clothes</td>
<td>3. land preparation</td>
<td>3. weeding</td>
</tr>
<tr>
<td></td>
<td>4. gardening (digging, weeding)</td>
<td>4. harvesting</td>
<td>4. marketing fish</td>
</tr>
<tr>
<td></td>
<td>5. fetching water</td>
<td>5. searching for vegetables</td>
<td>5. cattle herding</td>
</tr>
<tr>
<td></td>
<td>6. caring for sick</td>
<td></td>
<td>6. caring for sick</td>
</tr>
<tr>
<td>Uhasi village, Usigu division,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bondo district</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. weeding</td>
<td>1. digging</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. land preparation</td>
<td>2. weeding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. water collection</td>
<td>3. land preparation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. harvesting</td>
<td>4. harvesting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. searching for vegetables</td>
<td>5. searching for vegetables</td>
<td></td>
</tr>
<tr>
<td>SWARRA, Rarieda division, Bondo</td>
<td>No data</td>
<td>No data</td>
<td></td>
</tr>
<tr>
<td>district</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sibale village, Funyula division,</td>
<td>No data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Busia district</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nandafubwa village, Namable</td>
<td>No data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>division, Busia district</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 = most important constraint

Note: the data collected in SWARRA represented the views of a group of married women and FHHs
Source: data from the communities during fieldwork

Although all these tasks are time-consuming, their intensity varies. For example, digging, collecting water and pounding maize are physically demanding whereas tending to a fire or herding cattle require low levels of energy input but can be fairly tedious. Similarly, caring for a sick relative does not demand a lot of energy but is psychologically draining. Weeding during the rainy season is not only unpleasant, repetitive and taxing but also requires a degree of skill and dexterity.

Given the prominence of land preparation (clearing the land of shrubs, bushes and grasses; tilling the soil by digging or ploughing; and occasionally applying manure or fertilizer) and weeding as the most time-consuming tasks, the following sections focus on the reasons why they are so labour-intensive, and their effects on household wellbeing.
3.2 Causes of Labour Constraints in Land Preparation and Weeding

The principal causes of labour constraints arising in agriculture are threefold: the reliance on hand power arising from a limited use of alternative sources of power for farming; the reduction in the productivity of labour working in agriculture; and the reduction in the labour available in the household to undertake farm work. Each is explored in turn.

(i) Reliance on hand power

Humans are the principal source of farm power for almost all operations in Bondo and Busia districts. In the past, tractors and draught animals used to make a more significant contribution to land preparation activities. In Busia district, for example, it is estimated that a decade ago, 35% of the land was prepared by DAP and 10% by tractors; today these figures stand at 25% and 5% respectively (Diagram 3.1). Meanwhile, the contribution of hand power has increased from 55% to 70%. Thirty to 40 years ago the contribution of draught animals was even more significant, with DAP carrying out 80% of land preparation operations.

Diagram 3.1: Change in the Area Cultivated by Different Sources of Farm Power, 1992 – 2002, Busia District

Source: estimates from DALEO’s office, Busia

The number of draught animals has decreased dramatically recently which has contributed to the decline in the use of DAP. Livestock numbers have been decimated by:

- disease (trypanosomiasis and tick-borne diseases): tsetse fly infestation has increased due to the presence of more bushy vegetation and a decline in government-supported disease control services;
- sale to raise cash for household needs (food, school fees and medical expenses) particularly during the poor performance of the economy in the 1980s and 1990s;
- slaughter for rituals and customs (such as funerals);
- payment as dowry (paid by the bridegroom to his bride’s parents); and
- theft.

Once livestock numbers have fallen, there are several factors which inhibit restocking. Draught animals are relatively expensive: in Uhasi a donkey costs Ksh 6000 and an ox Ksh 8000 (approximately US$ 80 – 100 per animal). The tradition in this area is to use four animals (two pairs) for ploughing. Even when a farmer has a pair of animals he is reluctant to plough without the full complement. The total cost of re-establishing a ploughing team is in the order of US$ 400 which is well beyond the means of most rural households. Other constraints include inadequate skills in animal husbandry, shortage of animal feeds, inadequate access to livestock services, and a shortage of labour to care for livestock.

3 This figure varies between communities and is as high as eight animals in some communities. If new land is being opened, farmers often use an additional pair. Ploughing with only two animals is common in other parts of the country (Kaumbutho, 2000).

(Ayiemba et al., 2001). The opportunity to hire DAP is restricted by cost and time considerations since there is limited time available for land preparation.

The decline in the use of tractors results from the scaling down of government hire services (through the failure to maintain and replace tractors at the end of their life in part due to the centralised funding arrangements through Nairobi), coupled with an inability by households to afford the hire costs of the limited services available (provided by the private sector and local government). The effect of the collapse of the government tractor hire service is observable in changes in farm power sources for land preparation in Funyula division (Busia district).

The division benefited from being located close to a government tractor hire centre and, in the 1980s, farmers were able to take loans from the Agricultural Finance Corporation (AFC) to hire tractors for ploughing and labour for weeding. Since the demise of both AFC and the hire centre, the area tilled by tractor has fallen from 30% to a nominal amount (Diagram 3.2). Most of the burden has fallen upon humans who now for prepare 90% of the cultivated area.

Diagram 3.2: Change in the Area Cultivated by Different Sources of Farm Power, 1980s – 2002, Funyula Division, Busia District

Source: estimates by community during fieldwork
Widow and mother of four preparing her land with a hoe, Bondo District

Men preparing land using four oxen and a mouldboard plough, Bondo District
(ii) Reduction in labour productivity

Work in agriculture is often characterised by low productivity. This may be attributed to: the limited range of hand tools used by farmers; the poor quality of tools; and people’s lack of physical energy. The availability of tools varies markedly between different types of household. Within married households there are usually enough of the basic implements (in particular, the hoe) for each household member, as well as a fairly wide tool inventory. In households headed by women or orphans, the number and range is much more limited; once tools are worn out they are usually not replaced (with the exception of the hoe).

The hand tool market is dominated by imports; the Kenyan mass manufacturers were unable to compete with cheap imports from China and India. Imported pangas, slashers and sickles are readily available from open market traders and retailers at a unit cost of around Ksh 120 (approximately US$ 1.50) (a list of prices and availability of farm tools is presented in Appendix 5). The quality of the most important tool, the hoe, is invariably poor, with the market riddled with fake imported Chinese ‘Cock’ brand hoes (manufactured either in China or India). They offer a substantial price advantage to consumers at Ksh 130 (US$ 1.70) per hoe in comparison with Ksh 250 (US$ 3.25) for the genuine Cock brand hoes and Ksh 320 (US$ 4.15) for Chillington hoes. The persistence of the poor quality counterfeit market is caused, in part, by a lack of enforcement of the Kenyan standards for hand hoes (see section 5.2 for further discussion). However, it is exacerbated by limited knowledge amongst the farming community, coupled with their limited purchasing power. Local artisans still manufacture small quantities of hoes, either welding blades made from scrap steel on to hoe eyes (recycled from used and broken hoes) or fabricating a complete hoe. In addition to a price advantage, they can also tune their products to meet the specific needs of the local community, such as a hoe for weeding finger millet. Differing perceptions about the quality characteristics of a range of hand tools and their uses held by farmers, retailers, jua kali and government officials are presented in Appendix 6.

The productivity of humans is further compromised by their own physical weakness. Their lack of energy reflects a shortage of food and a reduction in the number of meals per day (particularly during the hungry seasons when the work requirements are high), poor nutrition, sickness and old age. Most communities now recognise HIV/AIDS as one of the major contributory factors accounting for the demise of the workforce. (This topic is discussed in more detail in chapter 4). In Funyula division, for example, it is estimated that 20 – 30% households are currently caring for someone dying of AIDS.

(iii) Reduction in the farming workforce

The size of the agricultural workforce at household level is generally declining, due to:

- a decrease in the number of people available for farm work: due to the priority placed on attending school; a lack of interest in farming among the youth and seeking alternative employment off-farm (usually involving migration); and the death of household members (often due to HIV/AIDS but also malaria and TB);
- the reduction in time available for farm work: due to competing claims on the time of key household members, such as caring for the sick and attending funerals; performing regular (usually daily) time consuming tasks for the household (collecting water, collecting firewood, preparing and cooking food) (see Box 3.1); and hiring out family labour in order to meet household needs; and
- a reduction in opportunity to hire in additional labour to assist with key activities: due to shortages of cash.
Small retail outlet selling hand tools, Bondo town, Bondo District

A range of hand hoes, Nandafubwa, Busia District
Box 3.1: Time Dimensions of Household Tasks

**Fetching water**

Although an increasing proportion of households have iron sheet roofs, the majority only practice opportunistic roofwater harvesting and rely on lakes, ponds or springs within the vicinity as their main water source. Uhasi and SWARRA communities enjoy relatively easy access to water sources but both experience problems with water quality which has implications for time in terms of treatment. In Uhasi they boil the water collected from Lake Victoria (thereby requiring extra firewood) whilst in SWARRA they use alum which uses a significant volume of water as part of the treatment process. In Nandafubwa, women walk 2 km to collect spring water which, with several journeys per day, amounts to a daily total of 2.5 hours.

**Collecting firewood**

Firewood is not readily available in Uhasi. Women have to walk for one hour before they start searching for firewood, a process which takes three hours. In total they spend five hours collecting firewood and they undertake this activity two or three times a week. In Sibale, the task is easier but it still consumes two hours every other day.

**Food preparation**

Most diets consist of only two ingredients: ugali and vegetables. Depending on the season, it is often necessary to look for one or other of the ingredients. During the dry season women spend time finding vegetables to purchase. Posho mills are becoming more widely available. The grinding mill is close to the community in Nandafubwa and women are able to go to the mill as part of the process of preparing lunch. In contrast, a return journey in Uhasi takes four hours; women have to go every other day because of cash constraints to pay for the milling fee (5/= for 2 kg maize to be milled). The ability to store food at home is being compromised by theft from granaries. Many households in SWARRA keep the crop in the field (such as beans) and fetch them when required.

**Cooking**

Most households cook on an open fire based on three stones. It is preferred to cooking on a stove because it is relatively quick, even though it requires a lot of firewood and, if windy, the kitchen fills with smoke and the fire is inefficient. The majority of rural households cannot afford the cost of purchasing fuel for the most common alternatives, namely charcoal and paraffin. Charcoal costs almost twice as much as firewood per meal (18/= versus 10/= if firewood is purchased). Moreover it is not possible to cook hard foods, such as beans, on a stove. Three to four hours can be spent just attending to the fire whilst cooking.

On occasions, households may actually increase in size, due to the return of people from urban areas (following retrenchment, lack of employment opportunities, or the onset of sickness) or taking in orphans to care for. However, despite the increase in the number of people in a household, the ratio between those active in agriculture and their dependants may deteriorate. In Funyula division, for example, it is estimated that only two out of five members of a typical household work on the farm; the others are either at school, working off farm, lack interest in farming or are sick.

### 3.3 Impacts of Labour Constraints on Agricultural Production and Household Wellbeing

In farming communities, labour and power shortages at the household level have an immediate and dramatic impact on agricultural production which ultimately affects household food security.

(i) **Land preparation**

Preparing the land for planting by using a hoe is very labourious and time consuming. Timeliness is critical yet if land is prepared before the rains, there may be insufficient moisture and the soil will be hard. If it is prepared late, it is difficult to dig in heavy wet soils. The task is more difficult if weed infestation is high or if certain weeds are present (for example, *Digitaria abbysinica* (couch grass)).
The significance of preparing land by hand is demonstrated in the time differences between digging by hand and using DAP or tractors. Based on data collected from the field, it takes approximately six times longer to prepare land by hand than by draught animals, and 100 times longer than using a tractor (Table 3.2). In addition to the tractor’s significant advantage of timeliness, the quality of tillage is much higher and subsequent weed infestation is much lower than other options. Moreover, when farmers hire DAP, they tend to omit the second ploughing and harrowing which also has implications for the cleanliness of the land. When land is prepared by hand, the quality of tillage reflects the health of the workers and deteriorates in a sick community.

<table>
<thead>
<tr>
<th>Source of power</th>
<th>hand per ha</th>
<th>per acre</th>
<th>draught animal per ha</th>
<th>per acre</th>
<th>tractor per ha</th>
<th>per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bondo district</td>
<td>62</td>
<td>25</td>
<td>7 – 10</td>
<td>3 – 4</td>
<td>&lt; 0.6</td>
<td>&lt; 0.25</td>
</tr>
<tr>
<td>Uhasi</td>
<td>3700</td>
<td>1500</td>
<td>3000 – 4000</td>
<td>1200 – 1600</td>
<td>4500</td>
<td>1800</td>
</tr>
<tr>
<td>Funya</td>
<td>4000</td>
<td>1600</td>
<td>Not available</td>
<td>Not available</td>
<td>Council: 4000</td>
<td>1600</td>
</tr>
<tr>
<td>Nambale</td>
<td>3000 - 3700</td>
<td>1200 – 1500</td>
<td>4200 - 4500</td>
<td>1700 – 1800</td>
<td>Not available</td>
<td>Not available</td>
</tr>
<tr>
<td></td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
<td>Government: 5000</td>
<td>2000</td>
</tr>
</tbody>
</table>

The actual number of days spent preparing the land prior to planting varies according to the health and age of workers and draught animals, the condition of equipment and the state of the land. Tilling land recently brought into cultivation may take 1.5 times longer than old land. The prices quoted are those paid when land is being prepared. *Source: various estimates from the field*

Tractor hire services are usually the most expensive in terms of cash but this does not take account of hidden costs associated with using DAP which usually include cooking for the labourers. Given the additional benefits of tractor ploughing (timeliness and better soil inversion through deeper tillage), there may be little cost advantage between the different power sources.

**(ii) Weeding**

Weeding is a critical activity and a major determinant of final yields. The amount of time varies according to the crop, ranging from 15 days for weeding 1 ha (six days per acre) of sorghum or finger millet; to 25 days per ha (10 days per acre) for groundnuts or sunflower; to 45 – 50 days per ha (18 – 20 days per acre) for maize or cassava (see Appendix 7 for labour profiles for key crops in Bondo district). The task becomes more time-consuming due to poor land preparation, high weed infestation and inappropriate spacing through broadcasting. Late planting prevents the crop from optimising its use of soil moisture. Soil disturbance during weeding stimulates weed growth and they compete with the germinating crop. Any reduction in the use of crop rotation encourages the establishment of certain weed species (for example, *Striga spp.*). The problem becomes compounded over several years of poor weeding.

The impact of late weeding on yields is substantial. The critical period for weeding depends on the crop grown, the type of weeds, and the quality of land preparation. KARI recommends that the first weeding of maize takes place two weeks after crop emergence and the second weeding four weeks after crop emergence (KARI, 1996). Research at NARL (KARI) has found yield losses of over 50% when weeds were controlled three weeks after emergence, rising to around three quarters of the crop being lost when weeds are controlled only after four weeks (Zimdahl, 1980).

**(iii) Overall effects**

The effects of labour and power shortages have an impact on the health of the farm and the health of the home. More land is left fallow and the bushy vegetation is a habitat for tsetse flies and pests such as squirrels. Less time is spent on labour intensive soil conservation and soil fertility measures which would sustain and improve the quality of the environment.
Low yields and poor harvests contribute to malnutrition, crop thefts, and efforts to reduce household size (for example, through early marriage). Families reduce the variety of food consumed and their number of meals. Nutritious maize and beans are replaced by quick cooking maize meal. Breakfast is skipped and food is not carried to the fields for snacks and lunch. Family members hire themselves out as casual labourers to generate cash to buy food but this reduces their time available for working on their own land. Children are withdrawn from school and either assist with farm work or work elsewhere (girls often take employment as housemaids).

Households can enter into a spiral of decline. Shortcuts in one season have knock-on effects in the next. The productivity of the land and the workforce deteriorates and, over time, people become demoralised and lack hope for their future.

3.4 Adjusting to Farm Power Constraints at the Household Level

(i) Scaling down and short cuts

Many households respond to their shortage of farm power by scaling down their activities by reducing the area under cultivation and growing a limited range of crops. They struggle to keep pace with the seasonal calendar which results in taking short cuts, such as poor land clearing and preparation, late planting, broadcasting seed and incomplete first weeding. (An example of a seasonal calendar for Nandafubwa, Nambale division is presented in Appendix 8). In Uhasi some households plant in small holes in preference to digging a whole field but weeding becomes more of a problem.

(ii) Making best use of the limited power available

Alternatively, households adopt various strategies to make the best use of their limited power by growing high value crops on a reduced area. In Uhasi, many of the households with access to irrigated land near the lakeshore (estimated to be 15% of all households) focus their efforts on irrigated agriculture producing crops for sale (tomatoes, sugarcane, sweet potatoes and vegetables) and for home consumption. As a result it is estimated that these households are food self sufficient for six to 10 months a year, in comparison to between four to eight months for households relying solely on rainfed agriculture.

There have also been breaks with tradition with some communities reducing the number of oxen they use for ploughing (from three pairs to two pairs) and increasing, albeit to a small extent, men’s participation in weeding.

(iii) Drawing in additional power resources

There are several ways in households may increase their access to farm power to assist with specific activities where timeliness is of the essence. The main determinants are affordability and availability. If cash is available (through waged employment, pensions or savings) households may hire labour. In Uhasi, fishermen and fish traders earn enough money to hire labour (usually migrants) to clear their land, dig, weed, harvest, look after their cattle, build their houses, and fetch water.

The opportunity to hire draught animals or tractors is severely constrained by their limited availability. DAP owners find it profitable to do so and curtail the preparation of their own land in order to maximise the opportunity to hire out their services. In Nandafubwa, for example, DAP owners spend one week ploughing their own land and three weeks ploughing elsewhere (covering 6 – 8 ha (15 – 20 acres) per season). In areas where DAP has traditionally been an important source of power, farmers work together, sharing oxen and equipment, in order to overcome the decimation of their herd.

In Funyula, where there is no tradition of DAP use, only 2% of households own draught animals and there is only one private tractor working in agriculture. For land preparation, it is estimated that 10% of households hire labour, 9% hire DAP and 2% hire tractors (Diagram 3.3). Family labour is the most important power source for land preparation and labour groups are becoming an increasing popular solution to overcome power constraints, particularly for weeding. In Funyula there is a tradition of working in digging groups of 10 to
15 members. In addition to working on each other's plots in turn, the group also hires themselves out. It is estimated that 70% of the community, including many widows, belongs to such groups. (Non-members comprise businessmen, the weak and sick, and those who are not interested).

Diagram 3.3: Sources of Power for Land Preparation and Weeding in Funyula, Busia District

(iv) Coping with power constraints

Few households have progressed beyond responding to the crisis, adapting cultivation methods to suit the power available. This finding emphasises the timeliness of this study to identify and promote the adoption of medium term adaptive strategies which will contribute to a more sustainable existence for rural households through addressing labour and power shortages.
4. HIV/AIDS AND ITS IMPACT ON HOUSEHOLD LIVELIHOODS

After identifying some of the characteristics of Bondo and Busia districts which contribute to their high prevalence rates of HIV/AIDS, this chapter focuses on the vulnerability of households arising from the impact of HIV/AIDS. Particular attention is paid to the nature of their vulnerability and the implications for agricultural production and household food security. Much of the discussion is based on household profiles prepared for SWARRA, Sibale and Nandafubwa communities, the details of which are presented in Appendices 9, 10 and 11 respectively.

4.1 HIV/AIDS Status in Bondo and Busia Districts

Bondo and Busia districts both experience HIV/AIDS prevalence rates well above the national average for Kenya and, in some communities in Bondo district, prevalence rates have been found to be as high as 45 to 50% (FAO, 2001). The most vulnerable are young people, usually men, aged between 20 – 35 years. HIV/AIDS is recognised as a major factor contributing to the increase in poverty in the two districts. Almost every family has been affected by the epidemic, through the loss of parents, spouses or siblings, or through caring for orphans.

There are three principal reasons which may explain this high incidence of HIV/AIDS in this area:

- **Location:** Both districts are close to the sizeable town of Busia and the Ugandan border where short term migration is commonplace, for casual work or trading in goods. Men also move between countries for longer periods for employment without their families. A major transport route between Mombasa and Kampala bisects Busia district, resulting in casual and transactional sex as an income source for women. Similar opportunities arise at major ports, such as Port Victoria in Busia district, which act as a focal point for the gathering of an international mix of people from all over Lake Victoria.

- **Fishing communities:** Prevalence rates are exceptionally high in fishing communities which are characterised by a high influx of single men and women from outside the locality. Men are attracted by the opportunity to earn money quickly by fishing and spend part of their earnings on buying sexual favours from women. This trend has increased due to the high retrenchment of workers from the cities. Widows who have lost their land after the death of their husbands and have refused to be inherited by their brother-in-law also make a living by moving to these communities. Women who trade in fish (*odingi*) pay the fishermen "with money, sex and tea" in order to buy fish at a favourable price.

- **Culture:** Another reason contributing to the particularly high prevalence of HIV/AIDS in Bondo are the traditional sexual rituals related to the Luo culture, in particular wife inheritance and cleansing of the dead body. Most traditional events are heralded by the consummation of sex which, if not observed, is feared to result in a curse falling upon the family (known as *chira* and has AIDS-like symptoms). The Luhya, the dominant ethnic group in Busia district, are less tied by cultural traditions. Wife inheritance has reduced drastically in the last two years as people have become aware that it contributes to the spread of HIV/AIDS. Although women are not allowed to hold official title to land, widows are increasingly being allowed to continue to use the land after the husband's death without being inherited.

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4 Such relationships between women and fishermen are also noted in FAO (2001).
5 At the beginning of all significant agricultural activities (such as cultivation, planting and harvesting) the head of the household must have sexual intercourse with his first wife, followed by the other couples in the homestead in hierarchical order. Widows are forced to look for a man for sex (at least symbolic) before their married sons can have sex with their wives prior to farming. The purpose of this practice is to promote food security for the whole family by curbing laziness in elder sons and encouraging communal farming (IFAD, 2003). However, it is likely that it contributes to the spread of HIV/AIDS and also delays agricultural activities. The lack of male circumcision amongst the Luo is also cited as another factor contributing to the high incidence of HIV/AIDS (Halperin and Bailey, 1999).
4.2 Increase in Number of Vulnerable Households

HIV/AIDS increases the number of vulnerable household groups. The sickness and death of key household members give rise to female-headed households (FHHs), male-headed households without wives and, in extreme cases, orphan-headed households (OHHs). Changes also arise from household enlargement where the basic household unit remains in tact but the number of household members increases. When both parents die, orphans are usually absorbed into their relatives' households, such as their parents' siblings, grandparents or other members of the extended family. An overview of the composition of these different types of household is presented in Box 4.1.

Box 4.1: Composition of Households

- **Traditional male-headed married households**: The husband is middle aged (between 30 – 50 years) and has responsibility for between three to five of his own children plus one or two orphans. The community in Nandafubwa was keen to reflect the distinction between polygamous and monogamous households (the former accounting for one quarter of all married households; each wife operates as a separate household unit). Heads of polygamous households are older, have fewer children per wife (four rather than six found in monogamous households), usually have two wives, and take in more orphans per wife (two or three rather than one or two). Today, fewer young men from monogamous households take a second wife, partly because of their concern about HIV/AIDS.

- **Female-headed households**: This group represents the most common type of vulnerable household arising from the effect of HIV/AIDS. Their relatively high incidence may be explained by two factors. Many widows who have been inherited by their husband’s relative continue to consider themselves to be FHHs if they continue to stay on their own in the house of their husband. Polygamy also contributes to the high incidence of FHHs because the death of one husband leaves several widows. These women are usually young, aged 30 – 35 years, caring for between four to seven children. They rarely have the capacity to look after orphans.

- **Male-headed households without female support**: These households are not very common because widowers usually remarry soon after the death of their wife. Also, in polygamous societies, the death of one wife does not affect the marital status of the overall household. They tend to be older than the widows (35 – 50 years), care for fewer children (two to five) and do not look after orphans.

- **Grandparent-headed households**: If both parents die, children are left with the extended family, in many cases their grandmother. The grandmothers are usually over 60 years old and may look after as many as six grandchildren.

- **Orphan-headed households**: If all else fails and no one is able to care for orphans, they are left to live alone in their parent’s house. The oldest child may be as young as 15 years, with responsibility for three to five siblings.

All communities have witnessed a significant growth in number of FHHs and OHHs during the last decade. In SWARRA, the community estimated that the number of FHHs has doubled and OHHs trebled during the last ten years (Diagram 4.1). The distribution of households between groups is broadly similar in the two study communities in Busia district. Married households account for 60 – 70% of all households, FHHs 15 – 20%, MHH without wives (around 10%) and a small proportion of grandparent- and orphan-headed households.

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6 In this community there are two cohorts of FHHs: one elderly group whose husbands died many years ago, and a younger group whose husbands have died during the last five years.
4.3 Challenges Facing Vulnerable Households

The challenges arising from the impact of HIV/AIDS differ according to household type. For enlarged households, the main challenge is how to cope with the growth in household size from the same resource base. This is particularly difficult when the orphans are young – representing more mouths to feed, more people to clothe, and more school fees to meet – without the capacity to make any significant contribution to household livelihoods. This position is more extreme in grandparent-headed households when they have already passed on resources, such as land, to their children. Dependency ratios between productive and non-productive members of the household become very imbalanced.

The challenges facing households where a key family member has died are more complex. Their severity increases from MHHs without wives (which are often only a temporary state before the man acquires a new wife), to FHHs and finally OHHs.

(i) Loss of labour and skills

At the onset of the disease, people may only partially withdraw from work but their participation decreases as the illness becomes more severe. Other people’s time is also lost for a significant period, perhaps lasting two to three years, whilst they care for the sick person. A peak loss of labour occurs directly after death, as family and close relatives are not meant to work on the field or in the household until several days after the funeral. This can be absolutely critical for household food security if it coincides with the planting season and an entire cropping season is lost.

The impact of the loss of labour varies according to which person has died and the nature of their contribution to the household. The gender division of labour reflects the societal pattern for allocating tasks between women and men within a community. In Nandafubwa, for example, women bear the main responsibility for home maintenance, kitchen gardens, planting specific crops and harvesting (Diagram 4.2). They also undertake most of the activities associated with caring for household members (fetching water and firewood, food preparation and cooking). Men are more involved with construction work (granaries, pit latrines, and soil and water conservation (SWC) structures), land clearance, ploughing with DAP and looking after livestock. If either the husband or the wife dies, not only does it have implications for the other person’s workload but also requires them to acquire a new range of skills. This impact is most acute in orphan-headed households when children have not had time to learn the skills from their parents before their death.
Diagram 4.2: Gender Division of Labour in Nandafubwa, Nambale Division, Busia District

SWC = soil and water conservation structures such as fanja juu, trash lines, cut off drains, diversion ditches and boundary bunds
Source: community estimates during fieldwork

(ii) **Loss of income**

In subsistence agriculture, many households engage in off farm activities in order to raise small sums of money which are crucial for their daily existence. Men often undertake these activities and their sickness and death directly affects the flow of petty cash into the household. Although the sum may not have been substantial, a small amount of cash often made a difference in terms of a household’s ability to meet school fees or afford to hire labour occasionally.

(iii) **Reduction and collapse of asset base**

The reduction of the livelihoods asset base starts during the time of sickness, as financial and physical assets (such as household goods, farm implements and sometimes land) are sold to cover medical expenses or to compensate the loss in production or other income generating activities. The funeral is another major drain on assets. The asset base may continue to decline after the death of the household member if the remaining family members lack the relevant skills to care for the resources (such as livestock) or there is insufficient cash to replace assets once they are worn out. FHHs and OHHs are vulnerable to property grabbing by relatives.

4.4 **HIV/AIDS as a Root Cause of Labour Shortage and Deteriorating Agricultural Production**

The evidence from the fieldwork suggests that many households in these communities were already facing power shortages prior to the HIV/AIDS epidemic. The impact of the latter has been to accentuate the shortages, changing the composition of the labour force and forcing households to adopt short term coping strategies which are often irreversible. Thus HIV/AIDS now plays a pivotal role in the emerging farm power crisis. Many of the labour constraints discussed in chapter 3 are more acute in households affected by HIV/AIDS.
(i) Change in workload

Households which have lost a key member are most likely to experience increased workloads and changed patterns of work. Many FHHs take on more casual work in order to generate the means to feed their family: for example, selling firewood, making ropes, fetching water, smearing mud on walls of houses, casual farm work, fish marketing, preparing illegal maize/sorghum brew. Not only does this reduce their time available for working on their own farm but may also introduce seasonal constraints, delaying critical activities such as weeding. The impact of the death of a husband on their wife’s workloads is demonstrated by comparing the daily activities of married women and FHHs in Nandafubwa at the busiest time of year (April) (see Appendix 12). Married women have a slightly shorter day (15 hours as opposed to 16 hours) in which they spend four hours in productive activities (weeding either at home or as part of a labour group or for payment), eight hours on household tasks (such as fetching water, cooking and looking after their children), and three hours resting. Widows spend more time on productive activities (up to seven hours a day when they are weeding on contract), less time on household work (five and a half hours) and enjoy more rest time (four and a half hours). The shift in their use of time may be explained by their need to earn more cash, coupled with fewer family members and the assistance of children with household tasks. Some tasks are reduced to a bare minimum, such as weeding and fetching water, which can have adverse effects on household wellbeing.

Men who lose their wives become responsible for the care and maintenance of the home. Whether they have to perform these tasks themselves depends on the age of their children and their ability to buy in assistance (such as fetching water and buying firewood). In Nandafubwa it was acknowledged that many widowers ‘have a lot of work now with household tasks because their wife has died’. They have fewer off farm activities and only grow a small area and limited range of food crops because they were usually grown by their wife. They also find it difficult to belong to groups because ‘they are so busy at home’. In other communities (Sibale and SWARRA) widowers become more involved with livestock production and cattle herding if they do not have family ties.

Orphans living alone usually experience fundamental changes in lifestyle. Older siblings drop out of school in order to work, either on their own land or more usually in casual employment. Girls may work as housemaids. Unless relatives are able to pay the school fees, younger children may also be withdrawn from school. Some orphans keep rabbits and chicken as income generating activities.

(ii) Compensating for loss of income

FHHs find it difficult to replace the income which their husband used to contribute to the household. Widows lack the capital to start new income generating activities (such as establishing kiosks or making handicrafts). Hence they compensate for their loss of their husbands’ income by doing more of the same, namely hiring out their labour and selling small amounts of food crops (even though they need them for home consumption). The preparation of Chang’aa, an illicit brew, is often taken to as a last resort. Few households receive remittances because relatives living in town are facing the same range of problems as those living in rural areas. Since widows have little opportunity to create new livelihood strategies after the death of their husband, it makes the loss of his income even more significant. Casual labouring is usually the most significant income source for all adults and the shamba remains the core source of rural livelihoods.

FHHs have to absorb many expenses which are traditionally borne by their husbands, such as school fees, food and medical care. By the time all essential items have been purchased, there is little money left to cover the costs of hiring labour. (Details of income and expenditure patterns for married households and FHHs in Nandafubwa are presented in Appendix 13).

(iii) Limited range of farm tools

One example of the collapse of the household asset base is demonstrated by the range of hand tools typically found in different types of household. The hoe is the only tool which is present in every household. Priority is placed on having one hoe for each household member who is able to work on the land. Even married households, with the fullest complement of hand tools, rarely have more than the bare minimum required for rural life: hoes, slashers, pangas and axes, representing a total value of Ksh 2200 (US$ 30) (Table 4.1). MHH without
wives and, to a lesser extent, grandparent HHs are also equipped with the essentials. The inventory held by FHHs deteriorates over time, as they are only able to raise sufficient cash to replace hoes. Many OHHs only have hoes, valued at Ksh 750 (US$ 10).

### Table 4.1: Inventory of Farm Hand Tools by Household Type, Sibale, Funyula Division, Busia District

<table>
<thead>
<tr>
<th>Household type</th>
<th>Married HHs</th>
<th>FHHs</th>
<th>Male HHs without wife</th>
<th>Grandparent HHs</th>
<th>Orphan HHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household size</td>
<td>6 – 9</td>
<td>6 – 8</td>
<td>5 – 6</td>
<td>5 – 8</td>
<td>5</td>
</tr>
<tr>
<td><strong>Average number of tools/HH (or if not present in all HHs, % HHs with tool)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hoe</td>
<td>6 – 9</td>
<td>6 – 8</td>
<td>5 – 6</td>
<td>5 – 8</td>
<td>5</td>
</tr>
<tr>
<td>Slasher</td>
<td>2</td>
<td>borrow</td>
<td>1 *</td>
<td>1</td>
<td>40% HHs</td>
</tr>
<tr>
<td>Panga</td>
<td>2 – 3</td>
<td>1</td>
<td>1 *</td>
<td>1</td>
<td>60% HHs</td>
</tr>
<tr>
<td>Axe</td>
<td>0 – 2</td>
<td>borrow</td>
<td>1 *</td>
<td>Some HHs</td>
<td>-</td>
</tr>
<tr>
<td>File</td>
<td>30% HHs</td>
<td>borrow</td>
<td>borrow</td>
<td>20% HHs</td>
<td>-</td>
</tr>
<tr>
<td>Rake</td>
<td>a few HHs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Shovel</td>
<td>a few HHs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wheelbarrow</td>
<td>a few HHs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Approximate value of inventory at full replacement cost</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ksh (US$)</td>
<td>2200 (30)</td>
<td>1200 (15)</td>
<td>1500 (20)</td>
<td>1600 (17)</td>
<td>750 (10)</td>
</tr>
</tbody>
</table>

Source: community estimates during fieldwork

### (iv) Sources of farm power

The use of different sources of power for land preparation varies significantly between household type depending on labour availability within the home, the availability of alternative power sources and cash to hire external assistance. Thus amongst the most resource poor households in Nandafubwa and SWARRA, namely OHHs and GHHs, family labour is almost the sole source of power (Diagrams 4.3 and 4.4). It is also very important in polygamous HHs where there is a large pool of family labour. At the other extreme, 20 – 25% of married households and MHHs without wives use their own draught animals for ploughing whilst a further 50% of these groups hire DAP services. In SWARRA where DAP is common, FHHs also hire oxen if they have the means to pay for the service. Labour groups are very popular amongst FHHs in Nandafubwa (which they often turn to after their husband’s death) and, to a lesser extent, among monogamous households.

### Diagram 4.3: Use of Farm Power for Land Preparation by Household Type, Nandafubwa, Nambale Division, Busia District

Area cultivated: married HHs – polygamous: 0.4 ha (1 acre) per wife; married HHs monogamous: 0.6 ha (1.5 acres); FHHs: 0.4 ha (1 acre); MHHs without wife: 0.2 ha (0.5 acre); OHHs: 0.2 ha (0.5 acre) (these figures exclude acreage under sugarcane which is ploughed by tractor under contract with sugarcane factory)

Source: community estimates during fieldwork
Diagram 4.4: Use of Farm Power for Land Preparation by Household Type, SWARRA, Rarieda Division, Bondo District

Area cultivated per season: married HHs: 0.8 ha (2 acres); FHHs: 0.4 ha (1 acre); MHHs without wife: 0.4 ha (1 acre); GHHs: 0.4 ha (1 acre); OHHs: 0.4 ha (1 acre)
Source: community estimates during fieldwork

Hired labour is not widely used for land preparation in either community (by 10% of each household type, with the exception of OHHs who do not use it at all). This suggests that if HHs are able to hire additional power, they would rather hire DAP. A significant proportion of married HHs and MHHs without wives hire labour for weeding but only widowers hire labour for harvesting, to compensate for the loss of their wives (Diagram 4.5). Overall, family labour is the most important power source for weeding and harvesting, for all household types.

Diagram 4.5: Use of Farm Power for Weeding and Harvesting by Household Type, SWARRA, Rarieda Division, Bondo District

Source: community estimates during fieldwork

(v)

Agricultural production

As a result of limited labour within the home and financial constraints on hiring additional services, the area cultivated in many vulnerable households is often only 50% of the area cultivated in married households. Orphan-headed households are the most disadvantaged since they do not have the means, other than their own effort, to open up land. The area
cultivated in grandparent-headed households depends on the strength of the grandparents and the age of grandchildren to assist. The area farmed in FHHs may be reduced if widows have to hire themselves out to fulfil immediate food and other household needs. A few FHHs hire out their land and, in Uhasi, some participate in sharecropping.

Due to the reduced availability of labour, households often change their cropping pattern to less labour intensive crops. In Sibale, for example, FHHs concentrate on staple food crops and produce fewer of their own cash crops (green grams and sesame). They also lose the income earned from their husband’s cash crops (such as tomatoes). In Nandafubwa, MHHs without wives and OHHs grow the bare essentials (maize and groundnuts), reflecting both the loss of family labour and skills. When widows are able to take over their husband’s sugarcane contract, the area cultivated is reduced due to a shortage of labour. Orphans are not able to take over sugarcane contracts until they are 18 years of age.

Livestock resources are significantly reduced in most HIV/AIDS-affected households. In Sibale, married households typically have four oxen, several cattle, one or two cows, ten goats, seven sheep and 15 – 20 chicken. A few also have donkeys and beehives. MHHs without wives still retain their livestock base in tact whereas FHHs are left with only a few cattle, goats and chicken. Grandparent- and orphan-headed households are reduced to a few poultry. Livestock are sold to raise cash throughout the sickness, funeral and post death phases of the illness. They also die due to a lack of livestock husbandry skills among the remaining relatives.

In the longer term, the death of men may have an adverse impact on the natural asset base. Men usually make soil conservation structures; if this work is not undertaken the land is subject to erosion and a loss of fertility, coupled with reductions in weeding and crop rotation, lead to reduced soil quality and yields. The loss of livestock as a source of manure exacerbate the situation.

(vi) Impact at household and community levels

As a consequence of the loss of labour and household assets, food security quickly decreases and malnutrition increases. Securing at best only two months food self sufficiency from their own resources, many grandparent and orphan HHs become dependent on food handouts and the goodwill of their neighbours and relatives in order to survive (Diagram 4.6). With the exception of monogamous households in Nandufabwa, all others have to reduce the number of meals, the variety and quantity of food consumed during the hungry seasons. HIV/AIDS is a major factor increasing poverty not only at the household level but also within the entire community. Many children are taken out of school one or two years after the death of the husband because their widows can no longer afford the school fees or they are needed to work in the home or earn income. With literacy rates well below the national average, any curtailment of education restricts the young’s access to education, limits their employment opportunities and compromises their ability to secure sustainable futures for themselves and their families. Social safety nets are breaking down because their capacity is over-stretched. The struggle of three widows and three orphans to eke out a living following the death of family members is captured in Box 4.2.
Diagram 4.6: Food Self Sufficiency by Household Type in Sibale and Nandafubwa Communities, Busia District

Source: community estimates during fieldwork

Box 4.2: The Widows’ and Orphans’ Perspective

**Grace** is middle aged living with two married sons in her compound. Her husband died in 1998. With the income he earned teaching they could afford to hire oxen for ploughing and were able to cultivate up to 1.6 ha (4 acres). Now she is only able to cultivate 0.6 ha (1.5 acres) by hand, growing the same range of crops (with the exception of cotton which is labour intensive). Today she only has one local cow and some chicken. Three bulls were sold to raise money for her husband’s medical treatment and the goats died soon after his death. When she has no money, she weeds other farms during March to May. This was not necessary when her husband was alive and delays her work on her own shamba.

‘Now I do everything out of time. If a large area is prepared it is not possible for me to weed it on time. As soon as I finish, I need to weed it again but sometimes I have to go and work somewhere else’.

**Joyce** is in her mid 30s and her husband died in 2002, leaving her to care for their five children plus two children from her co-wife (who had also died). Their children used to attend school but now there is no money for the fees. Another co-wife has been left with three children. Before her husband’s death, they never had a lot of money but they had some savings which they used to use to hire labour for digging and weeding. During her husband’s illness these funds were used to pay for medical treatment. Now she has to go out to weed on other people’s farms to earn cash. Only two of their six cows remain; two were slaughtered during the funeral and two others died. The poultry have also died from diseases.

‘What two people do together, you cannot manage on your own. Even though my husband did not work regularly off the farm, he did bring in small sums of money which we could use to hire labour. If it is not possible to raise this cash, life becomes very difficult. I don’t see anything good now, considering what my husband used to contribute to the household’.

**Theresa** is an elderly widow whose husband died 40 years ago. She was inherited by another man but they did not stay together long and she sent him away. Now she looks after her dead son’s child and another grandchild. She does not have the energy to cultivate her 1.2 ha (3 acres) so she digs a small area near the house to grow maize with the assistance of her grandchildren. Her chicken have been stolen. The family relies on charity for food.

**Derrick and Rosie** (13 and 10 years old respectively) lost both their parents during 2000. They have an elder brother who rents out the family land (1.8 ha or 4.5 acres) and keeps the income for himself; he now works in town. The two young orphans live alone, growing maize and sweet potatoes in the homestead. One of their neighbours recently gave them a chicken. Their uncle lends them a hoe for farm work and pays their school fees.

**Dorothy** (aged 10 years) lives with her grandmother following the death of her mother in 2000; her father died some years ago. She works in the fields with her grandmother growing sorghum, maize, sweet potatoes and cassava. So far, her grandmother has been able to support her attendance at primary school.

Source: Interviews with female-headed households in SWARRA, Bondo District, and orphans in Sibale, Busia District
5. INITIATIVES TO OVERCOME POWER CONSTRAINTS

This chapter reports on initiatives in Bondo and Busia districts that are currently being taken to help local communities overcome some of their power constraints.

5.1 Increasing Access to Farm Power

(i) Draught animals

There are two issues to address regarding the use of draught animals: firstly, to re-establish a base for DAP usage and secondly to broaden the scope of their use. Although DAP has a long history of use in western Kenya, it is highly under-utilised (Kaumbutho, 2000). Ploughing is the predominant field operation and DAP may occasionally be used for weeding or mounding up ratoon sugarcane. Communities are completely unaware of the potential of animal traction for ridging, planting, lifting groundnuts and other operations, such as conservation tillage. Although communities in Bondo district and Nambale division in Busia use donkeys for transport, their use for field operations is totally unknown.

Farming in Tsetse Controlled Areas’ (FITCA) represents a major initiative to support the use of DAP in Nyanza and Western provinces, including Bondo and Busia districts. FITCA, funded by the European Union, aims to increase livestock productivity through integrated crop and livestock production systems. During its first two years of operation, FITCA has worked successfully with communities to control tsetse fly through live baits, traps and bush clearance to remove tsetse fly habitat; trained farmers in use of DAP for planting, weeding and transporting, as well as ploughing; and is working to improve local cattle husbandry through disease prevention and control, improved feeding management, proper breeding management and an efficient animal health delivery system.

(ii) Tractor hire

With the almost complete demise of central government tractor hire services, new service providers are emerging in the local government, NGO and private sectors (see Box 5.1). Whilst these initiatives are welcome, opportunities for hiring tractors remains limited and localised. The only smallholder farmers with regular access to tractors are sugarcane farmers in Busia district. Others who would be interested in hiring tractors may find it difficult to raise sufficient interest in their area to make it feasible for a tractor to visit their area. Moreover, road haulage of bulky items such as construction materials is more profitable for tractor owners than land preparation.

5.2 Improving Quality of Tools

The legislative framework for improving the quality of farm tools is broadly in place. Kenya Standard 154 developed by the Kenya Bureau of Standards defines the standard of hand hoes that are statutorily acceptable to be sold on the Kenyan market. The committee responsible for revising the standard in 2000 was dominated by manufacturers and importers, with modest representation of other parties, namely research, academia and, most importantly, users. The link between the technical specifications of hoes and the performance desired by users (farmers) appears to be weak. Moreover, effective enforcement of the standard during pre-shipment inspection and on arrival of imports is crucial if the quality of mass produced hoes is to be improved.

Rural Technology Development Centres and Units (RTDC and RTDU respectively) test and transfer technology which is suited to needs and budget of the local farming community. In addition RTDCs engage in technology development. The RTDC in Siaya has focused on demonstrating DAP for tillage operations and weeding. Testing of equipment, such as power tillers and cultivators, is a lengthy process lasting several years to test their durability prior to recommending them to farmers. Reports on the findings are sent to donors of equipment, manufacturers and central government. However, the service would appear to be of limited immediate use to the local community since consolidated reports of the technologies tested are not kept at the station.
Box 5.1: Examples of Tractor Hire Service Providers

**Local government**
As part of Bondo County Council’s contribution to poverty reduction the Council recently (September 2001) purchased a Massey Ferguson 4240 tractor together with plough and trailer for Ksh 2.6 million (approximately US$ 33,400). Demand for the service for ploughing and haulage is high. During the land preparation season (October to February) ploughing receives priority. It is possible to plough 4 ha (10 acres) per day so the Council prefers to plough a minimum area in one locality. This favours farmers with larger acreages and requires smaller farmers to mobilise their neighbours in order to make it worthwhile for the Council to service them. To date, most clients are relatively well off, with off farm incomes, and are economically stable. These are early days to observe the sustainability of the service. The Council does not have its own workshop and is planning to use external services for maintenance.

**NGO**
Sustainable Rural Christian Community Development Programme (SURUC-CODEP) is a local NGO in Busia district supporting agricultural development through providing access to farm inputs, development education, and health services. In January 2002 the group received a gift of a new Panther tractor from Italy which is hired out for ploughing smallholders’ land for food crops.

**Private sector**
There are three privately owned tractors operating in Nambale division. One young man purchased a second hand tractor in 2000. He hires it out for three months during the long rains (December to March) and one month in the short rains (August to September). The tractor ploughs up to 3 ha (8 acres) per day for either food crops or sugarcane. For the rest of the year, the tractor is engaged in haulage operations.

Kisumu Innovative Centre, Kenya (KICK) used to work closely with the *jua kali* sector, developing skills and identifying appropriate technologies for local fabrication, including animal drawn equipment. However, this initiative ceased with the termination of funding from the International Labour Organization in 2000.

### 5.3 Changing Farming Practices

An alternative to promoting access to additional power inputs is to reduce the demand for power. Conservation agriculture (CA), also known as no till or minimum tillage agriculture\(^7\), is a method of farming which overcomes the critical labour peaks of land preparation and weeding by planting directly into a mulch or cover crop. Weed control is either by hand or by using pre- and post-emergent herbicides. At the national level, conservation agriculture is being promoted by Kenya Conservation Tillage Initiative (KCTI) (a consortium of KARI (NARL), MOARD and KENDAT) and is partly funded by the Swedish Regional Land Management Unit (RELMA). FITCA is taking the lead in introducing CA in Bondo and Busia districts.

Working through a public-private partnership with FITCA, government and Monsanto (the agro-chemicals manufacturer), farmers and extension staff have been trained in CA methods and demonstration sites established in Bondo and Busia districts (10 and 21 sites respectively). A site comprises 0.25 acre under CA and 0.25 acre under normal practices and is operated by farmers’ groups. Two people per division have been trained by RTDC Siaya in spraying techniques and maintenance of equipment. In order to promote the use of CA, Monsanto is subsidizing the cost of the herbicides and FITCA, the sprayer, for the first year.

The extent to which CA saves labour may be judged by reviewing the data for a CA site in Bondo. The early evidence suggests that the main advantage of CA is timeliness (it is not possible to review the impact on yields since this was the first season). It is estimated that 18 to 20 days are saved in preparing and weeding 0.1 ha (0.25 acre). Interestingly the costs of conventional methods in comparison to CA are very similar, when the labour inputs are computed into cash equivalents (Table 5.1). However, in order to realise the timeliness advantage farmers need access to cash to purchase the inputs.

\(^7\) Conservation agriculture aims to enhance agricultural production on a sustainable and environmentally-friendly basis following three principles: minimum soil disturbance or no tillage; maintenance of a permanent soil cover; and diversified crop rotation.
Table 5.1: MOARD-FITCA Conservation Agriculture Demonstration Site, Uhasi, Bondo District

<table>
<thead>
<tr>
<th>Control 0.1 ha (0.25 acre)</th>
<th>Conservation agriculture 0.1 ha (0.25 acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation</td>
<td>Chemicals</td>
</tr>
<tr>
<td>400/=</td>
<td>1000/=</td>
</tr>
<tr>
<td>Seeds (2 packets x 240/=)</td>
<td>Sprayer gang</td>
</tr>
<tr>
<td>480/=</td>
<td>50/=</td>
</tr>
<tr>
<td>First weeding</td>
<td>Seeds (2 packets x 240/=)</td>
</tr>
<tr>
<td>340/=</td>
<td>480/=</td>
</tr>
<tr>
<td>Second weeding</td>
<td>Sprayer gang</td>
</tr>
<tr>
<td>340/=</td>
<td>50/=</td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>1560/=</td>
<td>1530/=</td>
</tr>
</tbody>
</table>

Source: fieldwork data

At present, it is unlikely that the approach to CA using herbicides will be widely adopted. Households are struggling to meet their immediate needs and very few have spare cash to purchase herbicides. During the survey of retail and hardware shops in Busia and Bondo towns, very few shops were found to stock herbicides and, if they did, the volume of sales was negligible (one 250 ml container per month). There are also some serious environmental concerns: field observations suggest that follow up training is required for the spraying gangs. At present, they have a low knowledge base and are unable to distinguish between different types of spraying nozzles, not aware of the different regimes following the use of different types of herbicides, and are oblivious of the dangers of spraying close to water courses. They have minimal protective clothing (overalls but no gloves and mask).

5.4 Reducing the Burden of Household Tasks

The Home Economics service of MOARD actively disseminates information about fuel efficient stoves, such as clay liners and insulated baskets (commonly known as the fireless cooker). The clay liner (Ksh 150) saves on firewood (using approximately one third of firewood used on the conventional three stone fire) and the Home Economics service in Busia offers free installation. However, the quality of liners is variable and may crack due to misuse. The insulated basket, costing between Ksh 300-800, saves time twice: the cooking time saved in comparison to conventional methods is substantial (Table 5.2) as well as the time spent fetching firewood. A lack of awareness, coupled with extremely tight household budgets, inhibits its widespread adoption. Cultural tradition also acts as a barrier: a young married woman may not be able to use energy efficient stove if it has not been given to her by her mother in law (Villarreal, 2002).

Table 5.2: Cooking Times Comparing the Conventional Method with the Insulated Basket

<table>
<thead>
<tr>
<th>Food</th>
<th>Normal cooking time on fire</th>
<th>Cooking time with insulated basket (fireless cooker)</th>
<th>Cooking time on fire saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize/beans</td>
<td>2 hours</td>
<td>35 minutes</td>
<td>3 hours</td>
</tr>
<tr>
<td>Green grams</td>
<td>1 hour</td>
<td>30 minutes</td>
<td>1.5 hours</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>30 – 40 minutes</td>
<td>10 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Cassava</td>
<td>20 minutes</td>
<td>10 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Rice</td>
<td>25 minutes</td>
<td>5 minutes</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Chicken stew</td>
<td>fry + 1 hour</td>
<td>fry + 15 minutes</td>
<td>1 hour</td>
</tr>
</tbody>
</table>

Source: Home Economics service, Busia

The Farmers' Training Center in Busia demonstrates a range of post harvest and processing technologies, such as a manually operated cassava grater, a motorized cassava processor, solar dryers and mills.

5.5 Other Initiatives

(i) Farmer Field Schools

Busia is one of three districts implementing FFS-IPMM under the IFAD-TAG programme in Kenya. Since the pilot project for field schools in the east African region started in 1999, 231 field schools have been established. Farmers run the majority of schools (126 FFS) with the balance being run by staff. Topics covered included crop production (inter-cropping, cereals, vegetables, cassava, groundnuts, and bambara nuts), livestock (pigs, goats, dairy cows), kitchen gardening, balanced diet and utilization of crops, farm records and gross margins, soil conservation, group organization, commercial production and compost manuring. In the context of this study, it is interesting to note that some groups have already chosen to study energy saving devices and HIV/AIDS issues.
Fetching water from Lake Victoria with a donkey, Uhasi, Bondo District

Cooking using the clay liner, Sibale, Busia District
Observable benefits of the FFS systems include skills development and improved farm management among participating farmers and their change in attitudes towards farming as a business (creating employment and contributing to food security). The gap between agricultural extensionists and farmers has been bridged. The local agro-vet stockist base has developed in response to the demand for farm inputs. Design features of the FFS have also worked well. The grant system increases the ownership of the projects since farmers plan, design, budget and implement the whole project. Gender relations have been improved through the integration of female and male farmers in the FFS.

(ii) Community self help groups

There are numerous and varied self-help groups operating at community level. They range from those engaged in productive activities (such as horticultural production, fish ponds and poultry) to addressing issues of water supply, sanitation, hygiene and nutrition, to those improving access to health services and assisting in times of sickness and death. Some groups are formed specifically to overcome power constraints, such as informal ox sharing groups or labour groups. Merry-go-rounds are a popular form of collective saving; money is collected from group members on a regular basis (usually monthly) and the sum is given to a different member on each occasion. Self-help groups also act as a channel for training and accessing inputs.

The majority of households belong to groups; those who do not join include businessmen, the weak and sick, youth, those without hand tools (for labour groups) and those who lack cash for membership contributions. Women’s participation may be constrained by a shortage of time. Some are disenfranchised by poor group performance. Constraints faced by groups typically include a lack of capital, a lack of skills in group management and leadership, and an absence of technical skills. Whilst some groups have been in existence for over 10 years, many have been formed more recently. Others have ceased operating due to the misappropriation of funds and misguided leadership.

(iii) Credit

SAGA is a private company with eight shareholders, established on the premise that many NGOs offering credit are only able to do so as long as they have donor support. SAGA adopts a collective approach to development but functioning as a commercial organization. Saving is used as an entry point for financial assistance so groups (each with about 15 – 20 members) have to save Ksh 10 (less than US 15 cents) per member per month for about two years before they can receive a loan.

(iv) HIV/AIDS programmes

Most HIV/AIDS-related initiatives to date focus on prevention, voluntary testing, counseling and provision of home-based care. A few address the wider issues of the impact of HIV/AIDS on affected households. The International Community for the Relief of Starvation and Suffering (ICROSS) develops income-generating activities in agriculture and off-farm. Rural Energy Food Security Organization (REFSO) supports groups in adopting technologies to improve their livelihoods. Freedom From Hunger provides food to vulnerable groups and facilitates group formation for horticultural activities.

The District Development Officer (DDO) is charged with coordinating all HIV/AIDS related activities and interventions in the district including the implementation of the National HIV/AIDS Council’s nationwide programme which supports community based group initiatives and activities through the provision of small grants (up to Ksh 100,000). The first grants have recently been dispersed in Bondo, mainly to mixed sex groups and youth groups, who are skilled in writing project proposals. It is proving more difficult to involve vulnerable groups, in particular women. One barrier is the requirement for an existing bank account because women’s groups often do not have them (women do not have access to information and traditionally men deal with credit institutions).
6. OPTIONS FOR LABOUR SAVING TECHNOLOGIES AND PRACTICES, BARRIERS TO ADOPTION, AND RECOMMENDATION DOMAINS

In view of the severity of the on-going labour and farm power crisis which has been exacerbated by the impact of HIV/AIDS, this chapter distinguishes between households with their labour and resource base broadly intact, and those with a severely depleted resource base. Although the former type of household still represents the majority in rural communities, the latter are becoming an increasingly common phenomenon and their specific needs have to be considered separately.

This chapter falls in four principal parts. The first reviews labour saving technologies and practices which would appear to be most relevant for addressing the constraints identified by farming communities. The second part discusses barriers which prevent the two different household types from adopting technologies and the third section links the recommendation domains to household type. Follow-up activities that are of specific interest to FAO and IFAD are presented in the final section.

6.1 Options to Overcome Labour Constraints in Bondo and Busia Districts

The priority labour constraints to address in agriculture in Bondo and Busia Districts, as identified during the fieldwork, are land preparation and weeding. Collecting water and firewood, preparing food, and cooking are the most burdensome household tasks. Rural transport is a time consuming activity with both farming and household dimensions. The various ways in which these labour burdens can be addressed may be grouped hierarchically representing the degree of change they introduce into the farming and household system. Some practices make minimal demands on resources and can be introduced within the existing system whilst others require more significant changes, in terms of resources, skills and systems. The technologies and practices are grouped accordingly below and are presented in more detail in Tables 6.1 and 6.2.

Level 1: Working within the existing system and resource base
- make existing labour more productive: through better health and nutrition (this topic is, however, outside the scope of this study)
- make existing tasks easier in order to reduce the demand for labour: use appropriate tools, inputs (weed-tolerant varieties of seeds) or improved practices (such as row planting, correct spacing, mulching and cover crops to make the task of weeding easier)

Level 2: Drawing additional resources into the existing system
- use additional power sources (for example, hire or purchase DAP, tractors or other mechanical means of land cultivation)
- extend the use of existing power sources (use DAP for weeding and transporting)
- use fuel efficient stoves and simple food processing equipment

Level 3: Developing a new system
- release labour from other time-consuming tasks in order to concentrate on specific activities; for example, reducing the time spent: collecting water (by drilling boreholes or harvesting rainwater) and firewood (through planting woodlots), or improving rural transport in order to spend more time on productive activities such as farming.
- substitute labour intensive for less intensive activities (such as direct planting into cover crops or mulch, growing different crops or raising different livestock)
- introduce new power sources for household use, such as biogas or solar energy.

These options are not mutually exclusive and, in some circumstances, there is progression between the three levels. In order to weed using DAP (level 2), crops must be planted in rows (level 1). To adopt a minimum tillage system (level 3) first requires the establishment of cover crops or mulch (level 1).

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8 Many of these ideas were discussed during the plenary sessions held in each of the four study communities during the fieldwork.
9 These options have not been subject to an economic analysis regarding their viability in the context of the rural households of western Kenya.
Many of these technologies and practices have moved beyond the research stage and are already in the public domain. Product champions not only include leading government research agencies but also government outreach services and NGOs, as well as the private sector. Hence, in many instances, it is not necessary to invent labour saving technologies and practices. Rather, the need is to facilitate the adoption of current best practice through understanding the barriers to adoption.

Table 6.1: Farm Practices and Technologies to Reduce Burden of Land Preparation and Weeding

<table>
<thead>
<tr>
<th>Activity</th>
<th>Nature of opportunity</th>
<th>Opportunities to address labour and power constraints</th>
<th>Product champion</th>
<th>Barriers to adoption</th>
</tr>
</thead>
</table>
| Land preparation | Level 1: Existing system and resource base | • purchase more durable hand/DAP tools designed for task  
• correct use of tools  
• use fewer animals for ploughing  
• plant less labour intensive crops  
• switch to less labour intensive livestock (from cows to goats) | DAP equipment:  
KENDAT  
labour saving crops: seed suppliers | • lack of choice, knowledge  
• limited cash  
• weak bargaining position  
• lack of skills in use |
|                | Level 2: Existing system, additional resources | • hire or purchase additional power: DAP, tractor or other mechanical source | DAP: KENDAT,  
FITCA  
Tractor hire: local government, private sector | • lack of cash  
• lack of hire services |
|                | Level 3: New system | • change practice: direct planting into mulch or cover crop with minimal land preparation | KARI – NARL  
KCTI – KENDAT  
FITCA/Monsanto | • lack of knowledge  
• limited cash to switch systems (buy inputs)  
• time horizon  
• attitude |
| Weeding        | Level 1: Existing system and resource base | • purchase more durable hand/DAP tools designed for task  
• tools set up correctly for the task  
• correct use of tools  
• weeding at critical times before weeds become too established and damage the crop  
• farm planning to prepare an area manageable within own resources (particularly labour)  
• use row planting and correct spacing (along furrow and between rows) make it easier to identify weeds, work with tools between rows, whilst leaving less space for weeds to grow and minimising soil disturbance during weeding | DAP equipment:  
KENDAT  
FFS | • lack of choice, knowledge  
• limited cash  
• weak bargaining position  
• lack of skills in use  
• constrained by labour  
• limited cash to hire labour/DAP  
• unable to view farm as a business  
• lack of information  
• time constraints – broadcasting is quicker  
• labour constraints |
|                | Level 2: Existing system, additional resources | • plant recommended varieties which are weed tolerant (eg maize KSTP 94, striga tolerant)  
• suppress growth of weeds:  
• apply manure/mulch  
• plant cover crop (can also be a source of food or animal feed eg sweet potatoes SPK 004 or dilochos lablab)  
• intercrop  
• crop rotation breaks support for dominant weed species | KARI  
KCTI  
FFS  
KARI  
FFS  
KARI  
FFS  
KARI | • lack of awareness  
• limited availability on market  
• limited cash  
• lack of awareness  
• limited access to appropriate seeds  
• application of manure is labour intensive  
• constrained by shortage of land |
|                | Level 3: New system | • change practice  
• direct planting into mulch or cover crop reduces weeding activities | KARI – NARL  
KCTI – KENDAT  
FITCA/Monsanto | • lack of knowledge  
• limited cash to switch systems (buy inputs)  
• time horizon  
• attitude |
### Table 6.2: Technologies and Practices to Reduce Burden of Household Tasks

<table>
<thead>
<tr>
<th>Activity</th>
<th>Nature of opportunity</th>
<th>Opportunities to address labour and power constraints</th>
<th>Product champion</th>
<th>Barriers to adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household tasks</td>
<td>Level 1: Existing system and resource base</td>
<td>• solar water purification in a plastic bottle (low cost) reduces the amount of water collected (when alum is used much of the water has to be thrown away)</td>
<td>ITDG</td>
<td>lack of awareness</td>
</tr>
<tr>
<td></td>
<td>Level 2: Existing system, additional resources</td>
<td>• fuel efficient stoves to reduce fuel requirements (eg clay liner, insulated basket (fireless cooker - once food in insulated basket, self cooking and no energy required))</td>
<td>MOARD: Home Economics, FTC, ITDG</td>
<td>lack of awareness; lack of cash: clay liner = 150/= plus materials for installation (Home Economics service in Busia offers free installation); expensive to purchase basket (500-700/=) but can be home made for approx 300/= (but materials not readily available); lack of awareness; lack of cash: clay liner = 150/= plus materials for installation (Home Economics service in Busia offers free installation); expensive to purchase basket (500-700/=) but can be home made for approx 300/= (but materials not readily available); lack of knowledge on use and maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• simple food processing equipment to dry and process food</td>
<td>MOARD: Home Economics, FTC, ITDG</td>
<td>lack of awareness: barely introduced into rural communities; cost effectiveness</td>
</tr>
<tr>
<td></td>
<td>Level 3: New system</td>
<td>• domestic rooftop water harvesting for partial supply during dry season (many HHs already practice opportunistic RWH during rainy season)</td>
<td>Rainwater Harvesting Association, Nairobi</td>
<td>many HHs have iron sheet roofs but few have gutters and drums/tanks to store water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• plant trees to save time collecting firewood – agroforestry and woodlots</td>
<td>NALEP</td>
<td>woodlots of eucalyptus planted by men are used for building materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternative energy systems:</td>
<td></td>
<td>capital costs significant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• biogas slurry systems (already used by many zero-grazing cattle keeping communities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• solar power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural transport</td>
<td>Level 3: New system</td>
<td>Animal drawn carts save time:</td>
<td>KENDAT, FITCA</td>
<td>majority of transport is undertaken on head or by bicycle; donkeys used in Bondo for water collection; oxen rarely used for transport</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• collecting water and firewood;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• transporting produce from field to home, and from home to mill/market. Very useful for high load operations over short distances.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The significance of identifying three levels of technological change lies in the relative ease with which the farming community may adopt different practices. As more changes are introduced into the system, the greater demands that are made on the user. Changes within the existing system generally require specific knowledge and a short term commitment of time whereas drawing in additional resources or developing a new system of operation usually requires cash, skills and an ability to operate within a medium term time horizon. Factors inhibiting the adoption of specific practices and technologies are identified in the final columns of Tables 6.1 and 6.2.
6.2 Barriers to Adoption

This section distinguishes between two household types: those with their labour and resource base broadly intact and those with a severely depleted resource base. The barriers which inhibit each group from adopting labour saving technologies and practices differ, and this has implications for the recommendation domains which are presented below.

(i) Households with resource base largely in tact

In households with their labour and resource base largely in tact, there are seven principal barriers to adoption. They are:

- **Lack of knowledge**: Gaps in the information chain hinder the flow of new ideas and practices to the farming community. Intermediaries, such as retailers, are not well informed and often act in their own interests to make profits rather than serve the needs of rural communities. RTDCs and RDTUs do not keep on-site records of equipment they have tested. Farmers generally have extremely limited opportunities to find out about alternative practices and tools.

- **Limited choice**: Rural shops and wholesalers tend to hold a narrow range of stock which is of variable quality.

- **Poverty and lack of purchasing power**: Even modest changes invariably require cash and knowledge. In order to be able to purchase a more durable hoe, for example, customers must be aware of the quality characteristics of hoes. They also need cash, albeit modest amounts, to pay the incremental cost between a poor quality and good quality hoe. The total sum of money (approximating to US$2) is of the scale that can only be raised by a household over a period of up to four months and may be achieved only by deferring the purchase of something else. Hence poverty and many competing claims on a very limited budget may prevent people paying the incremental amount to purchase more durable hand tools. The purchase of a fuel efficient stove or herbicides is well outside a typical household budget.

- **Time constraints**: Ironically many labour saving practices require an immediate investment of time in order to gain future benefits. The time horizon may be short: for example, planting in rows with the correct spacing between plants is more time consuming than broadcasting but the benefits are reaped later in the season when weeding is easier. At the other extreme, it takes several years for tree planting to yield benefits in terms of saving time fetching firewood. Hence the absolute shortage of labour at the present may prevent the adoption of some technologies.

- **Weak bargaining position**: Small farmers, in particular women, feel helpless to complain about poor quality inputs. They find themselves in a weak bargaining position; they lack economic clout, they lack confidence, they have a weak voice with which to complain, travel to trading centres is an intermittent event, and market traders can be difficult to trace. Retailers also claim to be victims of a system which has poor enforcement of quality controls (such as the standards set out by the Kenyan Bureau of Standards).

- **Attitudes**: Some of the strategies used by farmers to cope with a crisis of labour shortage are culturally and traditionally perceived to be the worst way of farming. For example, planting directly into unprepared land immediately after the rains commence is perceived to be a clear sign of poverty and a lack of ability to hire sufficient power. However, farming without ploughing and with permanent soil cover is an integral part of conservation agriculture.

- ** Tradition**: patterns of adoption may be culturally determined. Innovations are traditionally brought into Luo homesteads by the head of household and improved practices and technologies have to be adopted in hierarchical order (Villarreal, 2002).

(ii) Vulnerable households

Barriers to adoption tend to be more extreme amongst the most vulnerable households. Their labour constraints are more severe, their asset base depleted, their cash resources stretched, and skills base limited (Table 6.3). They are both unwilling and unable to expose their households to any risks that may threaten the very existence of their highly susceptible livelihood base. Women’s groups, members of which may be drawn from these more vulnerable households, often do not have bank accounts. These characteristics pose additional challenges when trying to reach out to these groups.
Table 6.3: Constraints Facing Vulnerable Households

<table>
<thead>
<tr>
<th>Vulnerable households</th>
<th>Constraints to adopting technologies and practices</th>
</tr>
</thead>
</table>
| Female-headed households    | • Time: care of husband during sickness, loss of husband on death  
                               • Cash: purchase of medicines and treatment during sickness, loss of income generated by husband, purchase of medicines for wife and children  
                               • Asset base: sale during sickness exacerbated by funeral and property grabbing by relatives  
                               • Awareness/skills: often determined by gender division of labour |
| Grandparent-headed households | • Time: additional time required to care for young orphans but older orphans may assist with work  
                               • Cash: additional demands to meet needs of orphans  
                               • Asset base: may have already distributed major assets to children  
                               • Awareness/skills: limited time and energy to attend meetings and gain new skills |
| Orphan-headed households    | • Time: time and energy available but may have aversion to farming which is common amongst youth  
                               • Cash: extremely limited  
                               • Asset base: eroded during parents’ illness and death  
                               • Awareness/skills: may not have had time to learn from parents  
                               • Age: if under 18 years old, not eligible to open bank account, own land, register an organisation |

6.3 Recommendation Domains for Households with Resource Base Largely Intact

The majority of households have yet to experience the full devastating impact of HIV/AIDS in terms of the death of a key household member, usually accompanied by the depletion of the resource base. However, given the high prevalence rates, it is inevitable that many will face these challenges in the near future. The extent to which these ‘intact’ households can adopt labour saving practices and technologies before any change in their household resource base, may help them not only to overcome existing labour constraints but weather the ensuing labour crisis better.

There are three recommendation domains for promoting the adoption of labour saving technologies and practices in households which have not yet experienced significant labour stress.

(i) To increase farmers’ exposure to new ideas and access to information

- awareness creation through group training (such as farmer field schools), field days and visits
- strengthen the capacity of the retail sector to provide up-to-date and relevant information to enable farmers to make more informed choices through the establishment of show case shops which are stocked with a wide range of tools and supporting literature for display purposes, coupled with staff development in product knowledge (this is particularly important if moving into the use of potentially hazardous inputs such as herbicides)
- general information campaign to support farmers, retailers and artisans (through posters and radio programmes) in rural-based enterprises
- awareness raising about HIV/AIDS (Box 6.1)

Box 6.1: Addressing HIV/AIDS as a Cross Cutting Issue

- determine the extent to which the effective implementation of proposed development activities may be hindered by the impact of HIV/AIDS
- determine whether the activities could potentially increase people’s vulnerability to HIV/AIDS (such as women marketing produce in distant markets or extension staff staying away from home for several nights a week)
- identify appropriate preventative measures (for example, community sensitization about HIV/AIDS particularly targeting high risk groups, developing skills in home-based care, or supporting income-generating activities for women to reduce their need to resort to survival sex)
(ii) To develop appropriate skills and attitudes for the sustained use of labour saving technologies and practices

- create favourable attitudes among farmers towards new practices (such as direct planting into unprepared land)
- develop farmers’ practical skills through a forum such as the FFS

(iii) To increase farmers’ access to relevant technologies

- create closer links between farmers and others through establishing a discussion forum to bridge the gap between farmers, local artisans, distributors, retailers and government (possibly through the FFS) to work together to identify, develop and supply tools which meet farmers’ needs at prices they can afford, and provide technical support for their sustained use
- enable farmers to try new equipment and practices at minimum risk: for example, on-farm testing of a range of hand tools through the FFS where the school bears the risk
- develop farmers’ confidence as consumers through improving their negotiating skills
- establish buying groups to strengthen the bargaining position of farmers when purchasing tools and equipment
- advocate for consumer protection through, for example, a statutory requirement that the place and name of manufacturers of all hoes mass marketed in Kenya should be clearly distinguishable from each other, and the participation of farmers and artisans in drafting and reviewing national standards for farm tools and equipment (hand and DAP)
- establish linkages between farmers/artisans and microfinance and credit institutions, for animal restocking, acquisition of new tools and equipment, and development of artisanal sector
- review options for hiring and leasing of farm equipment

6.4 Recommendation Domains for Vulnerable Households

At present vulnerable households represent a significant minority, typically accounting for between 30 – 40% of the survey communities. However, with HIV/AIDS infection rates running at between 30 – 50% and no access to anti-retroviral drugs for prolonging life, the figures suggest that at least one third of the economically active population will die during the next four to five years (maximum life expectancy after infection is eight years). Households headed by women, orphans and single men will become increasingly common and their needs will have to be addressed urgently in order for this population not to be reduced to begging and living off charity.

Vulnerable groups need access to labour saving technologies and practices. However, their barriers to adoption are so severe that they require very different assistance to those households whose resource base is intact. Even options which fall within the existing system and resource base (level 1 options as discussed in section 6.1) are beyond their reach. Their labour availability is so tight that they can not adopt improved farming practices which require an immediate input of labour such as row planting or planting cover crops. Their household finances are completely over-stretched and are unable to meet basic needs (such as salt). In these desperate circumstances, three recommendation domains have been identified. They all rely on external financing in the recognition of the fact that these households have neither the spare cash to purchase additional inputs nor the labour to invest in adopting new practices.

(i) To meet the most pressing time constraints with immediate solutions

- support labour brigades to maintain crop production in the seasons during severe sickness and following bereavement.
- provide grants to support the adoption of technologies which immediately ease the workload of household members (such as fuel efficient stoves, boreholes, roofwater harvesting for domestic use, food processing and rural transport)
- help prolong the active and productive life of people living with HIV/AIDS (through informing them and their caretakers about the importance of good nutrition, hygiene and basic health)
(ii) To develop skills through the formation of FFS for vulnerable groups

- develop the capacity of facilitators and service providers to identify vulnerable groups and obstacles which hinder their participation in group activities (such as timing, venue, membership fees, or the need for their own hand tools)
- facilitate the formation of groups (it may be necessary for young orphans to link up with adults in order to register their group or open a bank account)
- identify and address the most urgent needs of vulnerable groups including: development of general life skills (orphan-headed households); agricultural practices which are suited to the labour force availability; crops which are not sensitive to timely planting; confidence building and development of self respect; group management and capacity building; accessing appropriate technologies
- develop new skills to replace those which have been lost through the death of household members (for example, women learning to care for livestock, or building soil and water conservation structures and constructing granaries)
- support the groups in proposal writing to secure funds for small agricultural and income generating activities specifically for HIV/AIDS affected households
- build partnerships with existing CBOs/NGOs to learn from their experiences

(iii) To invest in activities which will yield labour saving benefits in the medium term

- provide grants to support the establishment of medium term investments, such as woodlots
- provide grants to mechanise crucial farm operations

6.5 Follow-up Activities for FAO and IFAD

(i) Bondo TCP and Farmer Field Schools in western Kenya

Within the scope of the Bondo TCP and the IFAD-supported Farmer Field Schools operating in western Kenya, the activities listed below provide an immediate opportunity for follow-up to the field study:

- **FFS curriculum for farmers** on the principal themes of:
  - land preparation and weed management including the appraisal of hand tools by farmers on their plots and reporting of the findings to field school members (Appendix 14)
  - DAP for farm work and transporting for farmers and transporters, with the training of new draught animals as a weekly activity; some sessions would be attended by artisans to strengthen linkages and dialogue between the groups (Appendix 15)
- **curriculum for rural householders** on labour saving technologies and practices for household activities (Appendix 16)
- **curriculum for artisans** to develop their skills in the manufacture, servicing and repairs of equipment for draught animals (Appendix 17)
- **poster campaign** to better inform farmers and retailers about the selection and use of appropriate tools and equipment (see an example of a poster to guide hoe purchases in Appendix 18 to be produced in local languages).

(ii) Future areas of research

- **Agricultural Support Systems Division of FAO to develop strategies to increase farm power availability** through: establishing the viability of private DAP or tractor hire services; identifying mechanisms (including an enabling environment) to encourage small entrepreneurs to set up DAP/tractor hire services; identifying alternative sources of tractors and implements (such as second hand tractors or tractors from India and Pakistan) which could be imported to sub-Saharan Africa
- **detailed studies of the dynamics of HIV/AIDS and its impact** on different types of households, particularly in terms of food security, livelihood sustainability and their responses, and the interactions between intact households and vulnerable households.
• **economic analysis of labour saving technologies and practices** in terms of their productivity, profitability and other factors influencing their adoption and sustained use particularly amongst more vulnerable households.

6.5 Conclusion

It should be possible to alleviate some of the most pressing problems facing the farming community arising from labour constraints through the identification, dissemination and support of appropriate labour saving technologies and practices. With the growing crisis in changing household composition (triggered and exacerbated by HIV/AIDS), special attention has to be paid to addressing the particular needs of vulnerable groups. In particular, emphasis should be placed on developing their human and social capital along with the selective use of grants to enable them to adopt specific labour saving technologies.

It is important to recognise that most of these recommendations represent, at best, survival strategies under difficult conditions. Given the scale of the impending crisis arising from the full effects of HIV/AIDS pandemic in many parts of sub-Saharan Africa, much more will be required to secure sustainable livelihoods. Labour saving technologies and practices which are achievable within the existing resource base of intact households are unlikely to provide a sufficient base for the regeneration of the agricultural sector as envisaged at the recent World Food Summit. To generate sufficient surpluses to feed growing populations will require a fundamental shift in practices to reduce farm power requirements or a recapitalisation of the sector in order to increase power availability.
REFERENCES


41
APPENDIX 1: MEMBERS OF STUDY TEAM

(i) Core study team

Clare Bishop-Sambrook, Agricultural Economist and Team Leader, IFAD Africa II Consultant
Josef Kienzle, Agricultural Engineer and Study Coordinator, FAO AGST
Maren Lieberum, Nutritionist and HIV/AIDS Specialist, FAO SDWP Consultant
Hottensiah Mwangi, Weed Scientist, KARI Consultant
Pascal Kaumbutho, Agricultural Engineer and DAP Specialist, KENDAT Consultant
Louis Othieno, Small Scale Manufacturing Specialist, ITDG Consultant

(ii) Additional members in Bondo District

Toko Kato, Gender specialist, FAO TCI
Kenneth Ayuko, Project Coordinator, Bondo FAO TCP
Bonventure Achonga, District Farm Management Officer and FFS Coordinator in TCP
Nicholas Odhiambo, District Agricultural Engineer
Abergaile Odhingo, District Home Economics Officer, Rural Youth and HIV/AIDS
Isaac Dawo, Division Extension Coordinator, Usigu Division
Joseph Onienda, Divisional Soil Conservation Officer, Usigu Division and Divisional Mechanisation Officer (FITCA)

(iii) Additional members in Busia District

Wilson Oduori, District Agricultural Officer and FFS Coordinator
Salestinus Kasiba, Head of Mechanisation and Rural Technology Demonstration Unit
Alice Kafwa, Gender and Youth Officer, District Home Economics
Antonina Ogema, Funyula Division Extension Coordinator
Simon Mwombe, Nambole Division Extension Coordinator
Charles Maloba, Nambole Division Extension staff
APPENDIX 2: LIST OF ORGANISATIONS AND PEOPLE MET

(i) Bondo District

District Development Committee: District Officer, District Adult Education Officer, District Education Officer, District Development Officer, District Agricultural and Livestock Extension Officer, Clerk to the Council, District Economics Officer, Farm Management Officer
DALEO’s office: David Obondo, Usigu Division Crops Officer; Musula, Rarieda Division Soil Conservation Officer
Bondo Town Council: E E Olwanda, Clerk
Bondo County Council: Mark Abuok Ombworo, Acting County Treasurer; George Ogdler, Stores Clerk
Kenyan National Farmers’ Union: George Owino, District Chairman
SAGA, Saving and Credit Microfinance Scheme: Harry Mugwanga, Economist
ICROSS Programme, Ministry of Health: Paul Omullo, Project Coordinator

(ii) Busia District

District Commission: N O Hirabae, District Commissioner
DALEO’s Office: Andrew Kaptalai, DALEO; Gerald Owino, Appropriate Technology Officer; Antonina Ogema, Home Economics Officer
FITCA: Burkhard Bauer, Project Manager; Caroline Sikuku, DAT and Crops Coordinator
FTC: R Ohore, Principal; Joseph Odima, District Applied Technology Officer; Florence Awunya, Training Officer
Medicines sans Frontiere: Obwoyo Gubiri
Voluntary Testing Centre: Obwogo Subiri
Rural Energy and Food Security Organisation (REFSO): Andrew Edewa, Head of Mission
KARI, Alupe: M Kisuya, Director; Mr Wambula; Mr Kollo
Sustainable Rural Christian-Community Development Programme (SURUC-CODEP): Lawrence Awino Njega, Programme Coordinator; Canute Ochongo Achuera, Assistant Programme Coordinator; Francesca Abiero Olande, Groups Coordinator; Mary Ajwang Otieno, Assistant Groups Coordinator

(iii) Nairobi

Kenya Bureau of Standards: Miheso Chomu, Senior Principal Standards Officer; Augustine Wachira, Standards Officer; J M Gachanja, Standards Officer
Techno Relief Services Ltd: Vijay Ojha, Export Director; Himanshu Dixit, General Marketing Manager
ITDG, Kenya: Lydia Muchiri, Energy Programme Training Officer

(iv) Other

Kisumu Innovation Centre – Kenya (KIK): Martin Osumba, Manager
Siaya District RTDC: Michael Ochieng, Officer in Charge; Philip Obuya, Agricultural Engineer/ DAP Coordinator; George Obuoda, DAP Technology
**APPENDIX 3: SUMMARY OF FIELD SURVEY METHODS USED**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Purpose</th>
<th>Composition of sub-group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical timeline</td>
<td>changes in the composition of the community, labour availability</td>
<td>community leaders, owners of ploughs</td>
</tr>
<tr>
<td></td>
<td>changes in agricultural/household practices that have taken place and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the reasons for those changes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>use of technologies/practices at present and changes over time</td>
<td></td>
</tr>
<tr>
<td>Organisational profiling</td>
<td>formation and activities</td>
<td>members of organisations (women and men)</td>
</tr>
<tr>
<td></td>
<td>membership and leadership composition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>role in addressing labour constraints</td>
<td></td>
</tr>
<tr>
<td>Seasonal calendar</td>
<td>seasonal use of time in community</td>
<td>community representatives, farmers (women and men)</td>
</tr>
<tr>
<td>covering farm and off-farm activities</td>
<td>gender division of labour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>use of tools and equipment for different tasks</td>
<td>fishermen</td>
</tr>
<tr>
<td>Household profiling</td>
<td>socioeconomic characteristics of different types of household</td>
<td>community leaders</td>
</tr>
<tr>
<td></td>
<td>different types of labour constraints faced by different types of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>household</td>
<td></td>
</tr>
<tr>
<td>Daily activity schedules at the busiest/quietest times of the year</td>
<td>workloads and division of labour between household members</td>
<td>female-headed households, married women</td>
</tr>
<tr>
<td>Ranking of sources and uses of money</td>
<td>sources of income and patterns of expenditure for women and men</td>
<td>female-headed households, married women, men</td>
</tr>
<tr>
<td>Equipment inventories at HH level</td>
<td>tools and equipment in use in the home</td>
<td>female-headed households, married women</td>
</tr>
<tr>
<td>Problem analysis of labour constraints, including ranking exercise</td>
<td>priority labour constraints, their causes and effects</td>
<td>farmers (women and men), fishermen, female-headed households, married women</td>
</tr>
</tbody>
</table>
### APPENDIX 4: COMPOSITION AND ATTENDANCE AT COMMUNITY MEETINGS

<table>
<thead>
<tr>
<th>Location</th>
<th>Composition of group</th>
<th>Data collection methods used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uhasi</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 1</td>
<td>Farmers and fishermen: 2 women, 7 men</td>
<td>Historical timeline</td>
</tr>
<tr>
<td></td>
<td>Farmers and fishermen: 2 women, 12 men</td>
<td>Organisational profiling</td>
</tr>
<tr>
<td></td>
<td>Farmers and fishermen: 2 women, 6 men</td>
<td>Problem analysis</td>
</tr>
<tr>
<td>Day 2</td>
<td>FHHs: 16</td>
<td>Problem analysis</td>
</tr>
<tr>
<td></td>
<td>Married women: 11</td>
<td>Individual HH interviews, income and expenditure, equipment inventory</td>
</tr>
<tr>
<td></td>
<td>Fishermen: 22 men</td>
<td>Equipment inventory</td>
</tr>
<tr>
<td></td>
<td>Farmers: 12 men</td>
<td>Equipment inventory, income and expenditure</td>
</tr>
<tr>
<td>Day 3</td>
<td>Community meeting: 15 women, 35 men</td>
<td>Review of understanding of labour constraints faced in community (problem tree) Discussion of possible ways forward: land preparation and weed management, appraisal of hand tools, fuel efficient stoves</td>
</tr>
</tbody>
</table>

| **SWARRA** |                      |                             |
| Day 1     | Community leaders: 3 men | HH profiling                |
|           | Farmers: 8 men          | Seasonal calendar          |
|           | Farmers: 12 women       | Problem analysis of farming, historical change |
|           | Farmers: 11 women       | Problem analysis at HH level |
| Day 2     | FHHs: 9                | Individual HH interviews    |
| Day 3     | Community meeting: 25 women, 12 men | Review of understanding of labour constraints faced in community (problem tree) Discussion of possible ways forward: land preparation and weed management, appraisal of hand tools, fuel efficient stoves |

| **Sibale** |                      |                             |
| Day 1     | Community representatives: 1 woman, 6 men | Problem analysis          |
|           | Community representatives: 7 men          | Problem analysis          |
|           | Community representatives: 1 woman, 6 men | Seasonal calendar         |
| Day 2     | Village leaders: 8 men | HH profiling                |
|           | Farmers: 10 married women and 2 orphans | Daily activities, income and expenditure |
|           | FHHs: 21               | Problem analysis           |
|           | Members of organisations: 2 women, 9 men | Organisational profiling, historical change |
| Day 3     | Community meeting: 40 women, 20 men | Review of understanding of labour constraints faced in community (problem tree) Discussion of possible ways forward: land preparation and weed management, appraisal of hand tools, fuel efficient stoves, organisational composition |

| **Nambale** |                      |                             |
| Day 1      | Plough owners: 2 women, 7 men | Historical review          |
|            | Village leaders: 1 woman, 3 men | HH profiling               |
|            | Farmers: 12 women, 10 men | Seasonal calendar          |
|            | Farmers: 8 women          | Problem analysis            |
|            | Farmers: 12 men          | Problem analysis, historical review |
| Day 2      | FHHs: 11                | Daily activities, income and expenditure |
|            | Married women: 16       | Daily activities, income and expenditure |
|            | Members of organisations: 3 women, 20 men | Organisational profiling |
|            | Plough owners: 4 men     | Individual HH interviews    |
| Day 3      | Community meeting: 32 women, 26 men | Review of understanding of labour constraints faced in community (problem tree) Discussion of possible ways forward: land preparation and weed management, appraisal of hand tools, DAT, fuel efficient stoves, organisational review |
### APPENDIX 5: LIST OF PRICES AND AVAILABILITY OF FARM TOOLS

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
<th>Trade mark</th>
<th>Country of manufacture</th>
<th>Price (Ksh)</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAND TOOLS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hoe</td>
<td>3 lb</td>
<td>Cock</td>
<td>China</td>
<td>250</td>
<td>wide</td>
</tr>
<tr>
<td>hoe</td>
<td>3 lb</td>
<td>Chillington</td>
<td>Thailand</td>
<td>320</td>
<td>occasional</td>
</tr>
<tr>
<td>hoe</td>
<td>1.5 lb</td>
<td>Cock</td>
<td>China</td>
<td>140 – 180</td>
<td>rare</td>
</tr>
<tr>
<td>hoe</td>
<td>3 lb</td>
<td>fake Cock</td>
<td>India/China</td>
<td>130</td>
<td>wide</td>
</tr>
<tr>
<td>hoe</td>
<td>various</td>
<td>jua kali</td>
<td>Kenya</td>
<td>40 - 140</td>
<td>occasional</td>
</tr>
<tr>
<td>hoe</td>
<td>with spike</td>
<td>jua kali</td>
<td>Kenya</td>
<td>50</td>
<td>rare</td>
</tr>
<tr>
<td>fork hoe</td>
<td></td>
<td>blacksmith</td>
<td>Kenya</td>
<td>300</td>
<td>occasional</td>
</tr>
<tr>
<td>jembe handle</td>
<td>wooden</td>
<td></td>
<td>Kenya</td>
<td>20</td>
<td>wide</td>
</tr>
<tr>
<td>panga</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>40 - 140</td>
<td>occasional</td>
</tr>
<tr>
<td>slasher</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>50</td>
<td>rare</td>
</tr>
<tr>
<td>file</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>300</td>
<td>occasional</td>
</tr>
<tr>
<td>sickle</td>
<td>12&quot; and 16&quot;</td>
<td>Cock</td>
<td>China</td>
<td>80 - 120</td>
<td>wide</td>
</tr>
<tr>
<td>axe</td>
<td></td>
<td>Diamond</td>
<td>China</td>
<td>450</td>
<td>occasional</td>
</tr>
<tr>
<td>shovel</td>
<td></td>
<td>Elite</td>
<td>Kenya</td>
<td>250</td>
<td>wide</td>
</tr>
<tr>
<td>wheelbarrow</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>1800</td>
<td>wide</td>
</tr>
<tr>
<td>wheelbarrow</td>
<td>jua kali</td>
<td></td>
<td>Kenya</td>
<td>2500</td>
<td>occasional</td>
</tr>
<tr>
<td>shears</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>350</td>
<td>rare</td>
</tr>
<tr>
<td>rake</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>100 - 200</td>
<td>occasional</td>
</tr>
<tr>
<td>knapsack sprayer</td>
<td>16 litres</td>
<td></td>
<td>China</td>
<td>1000</td>
<td>occasional</td>
</tr>
<tr>
<td>hand pump sprayer</td>
<td></td>
<td>Hobra</td>
<td>Kenya</td>
<td>2500</td>
<td>occasional</td>
</tr>
<tr>
<td>watering can</td>
<td>metal</td>
<td>jua kali</td>
<td>Kenya</td>
<td>380</td>
<td>occasional</td>
</tr>
<tr>
<td>watering can</td>
<td>plastic</td>
<td>Kenpoly</td>
<td>Kenya</td>
<td>500</td>
<td>occasional</td>
</tr>
<tr>
<td><strong>DAP EQUIPMENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plough</td>
<td></td>
<td>Lagrotech, Kisumu</td>
<td>Kenya</td>
<td>4000</td>
<td>occasional</td>
</tr>
<tr>
<td>plough</td>
<td>Bukura Mark II</td>
<td>jua kali</td>
<td>Kenya</td>
<td>4500</td>
<td>rare</td>
</tr>
<tr>
<td>plough</td>
<td>Victory</td>
<td>jua kali</td>
<td>Kenya</td>
<td>5000</td>
<td>rare</td>
</tr>
<tr>
<td>plough</td>
<td>Dinosaur</td>
<td></td>
<td>India</td>
<td>4900</td>
<td>rare</td>
</tr>
<tr>
<td>weeder</td>
<td>Lagrotech, Kisumu</td>
<td></td>
<td>Kenya</td>
<td>3500</td>
<td>rare</td>
</tr>
<tr>
<td>multi-tool bar</td>
<td>Bukura</td>
<td>jua kali</td>
<td>Kenya</td>
<td>16000</td>
<td>rare</td>
</tr>
<tr>
<td>weeder or harrow</td>
<td>adjustable width</td>
<td>jua kali</td>
<td>Kenya</td>
<td>6000</td>
<td>rare</td>
</tr>
<tr>
<td>cart</td>
<td>jua kali</td>
<td></td>
<td>Kenya</td>
<td>16000 - 20000</td>
<td>rare</td>
</tr>
<tr>
<td>share</td>
<td>Dinosaur</td>
<td></td>
<td>India</td>
<td>150</td>
<td>wide</td>
</tr>
<tr>
<td>landslide</td>
<td></td>
<td></td>
<td>India</td>
<td>100</td>
<td>wide</td>
</tr>
<tr>
<td>mouldboard</td>
<td></td>
<td></td>
<td>India</td>
<td>450</td>
<td>occasional</td>
</tr>
<tr>
<td>plough wheel</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>250</td>
<td>occasional</td>
</tr>
<tr>
<td>bolt for yoke</td>
<td></td>
<td></td>
<td>Kenya</td>
<td>150</td>
<td>occasional</td>
</tr>
<tr>
<td><strong>IRRIGATION EQUIPMENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>water pump</td>
<td>petrol-driven</td>
<td></td>
<td>Japan</td>
<td>28000</td>
<td>rare</td>
</tr>
<tr>
<td>treadle pump</td>
<td>Money maker</td>
<td></td>
<td>ApproTEC</td>
<td>2990</td>
<td>rare</td>
</tr>
<tr>
<td>treadle pump</td>
<td>Super money maker</td>
<td></td>
<td>ApproTEC</td>
<td>5990</td>
<td>rare</td>
</tr>
<tr>
<td><strong>AGRO-CHEMICALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>herbicides</td>
<td>250 ml</td>
<td>Roundup</td>
<td>Monsanto</td>
<td>300</td>
<td>occasional</td>
</tr>
<tr>
<td>pesticides</td>
<td>100 ml</td>
<td>various</td>
<td>Various</td>
<td>120</td>
<td>occasional</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool</th>
<th>Community</th>
<th><em>Jua kali</em></th>
<th>Retailers/Open market traders</th>
<th>Government officials</th>
</tr>
</thead>
</table>
| Cock hoe 3 lb               | • aware that there are genuine and fake Cock hoes  
• however not all are aware of distinguishing features between the two (eg stamp of place of origin) | no information | • know design characteristics of genuine hoe  
|                             |           |            |                               | • aware of differences between genuine and fake hoes |
| Fake Cock hoe 3 lb          | • know that sometimes the labelling is misleading  
• wear out fast, break easily at neck  
• need to inspect before purchase otherwise can buy ones that are already cracked  
• buy fakes because they are the only ones available | very weak  
• breaks at the neck | breaks easily  
• nevertheless, more durable than *jua kali* made hoes  
• some prefer to sell fake hoes because cheaper so more farmers buy them | • aware that there are many fake hoes on the market  
• problem is lack of enforcement of Kenyan official standards for hoes |
| Chillington hoe 3 lb        | • not readily available locally – used to be able to buy it  
• good quality – sharp definition on the tine  
• dig faster with this hoe because good curve on blade  
• however, brand no longer reliable | original Chillington was of better quality | • more hardy than other hoes  
• preferable | • durable |
| Local hoe made by *jua kali*| • not widely available  
• better than fake Cock hoe  
• nice curve on blade  
• durable | better than fake Cock hoe because has stronger neck | cheap for farmers to buy  
• farmers can see the eye and blade are welded properly together | • very weak  
• difficult for farmers to know the quality |
| Local hoe made by blacksmith| • in Busia only known by older people as stopped being used in 1940s  
• now only available in Luo land, made by specific families  
• good quality, more durable than fake Cock hoe  
• some would not buy it as it is perceived to be an old model | made from old shares, no welding  
• *jua kali* made hoes more durable | do not sell | farmers can see the quality |
| Fork hoe                    | • used by a few HHs for weeding couch grass  
• less tedious for digging because do not lift up a lot of soil  
• expensive but durable | more expensive than normal hoe so not bought very often | can not be made locally, always imported | useful for minimum tillage |
| Local hoe with narrow blade | • good for planting groundnuts and beans between rows of maize  
• good for weeding sorghum, millet, groundnuts, beans, bambara nuts  
• light weight, liked by women | narrow blade suited to heavy soils  
• use for weeding round small plants | not sold much | made from mild steel  
• not durable  
• not comply with Kenyan official standards |
| Long handled (Dutch) hoe    | • never seen before  
• use for nursery bed preparation  
• use as a rake to collect trash together  
• cannot use for weeding because soils too heavy  
• cannot weed standing up with long handle (‘tools do not allow you to stand’) | never seen before  
• use for weeding in well prepared seedbed  
• good for women because light  
• long handle will reduce backache | never seen before  
• use for weeding in garden, remove excrement from deep litter chicken systems | use for weeding, light work |
### APPENDIX 7: LABOUR REQUIREMENTS FOR MAJOR CROPS, BONDO DISTRICT

**Labour inputs for 1 ha of Major Crops in Bondo District**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Work days per hectare (at lowest level of management)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pure stand maize</td>
</tr>
<tr>
<td>Land preparation (digging)*</td>
<td>75</td>
</tr>
<tr>
<td>Planting</td>
<td>20</td>
</tr>
<tr>
<td>First + second weeding</td>
<td>45</td>
</tr>
<tr>
<td>Sevin application</td>
<td>-</td>
</tr>
<tr>
<td>Ridging</td>
<td>-</td>
</tr>
<tr>
<td>Thinning</td>
<td>-</td>
</tr>
<tr>
<td>Harvesting</td>
<td>10</td>
</tr>
<tr>
<td>Thresholding and winnowing</td>
<td>2</td>
</tr>
<tr>
<td>Shelling</td>
<td>-</td>
</tr>
<tr>
<td>Sorting and bagging</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
</tr>
</tbody>
</table>

* days for land preparation calculated on basis daily wage rate = Ksh 50
** crop requires second ploughing
*** data for processing cassava not available

*Source: MOARD (2002) Farm Management District Guidelines, Bondo District, Bondo: DALEO*
# APPENDIX 8: SEASONAL CALENDAR FOR NANDAFUBWA, NAMBALE DIVISION

<table>
<thead>
<tr>
<th>Rainfall</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-farm activities</td>
<td>Rethatching the house (50/50)</td>
<td>Smearing house 100%♀</td>
<td>Digging pit latrines 100%♂</td>
<td>Uprooting striga weed soil cons structures</td>
<td>Constructing, repairing granaries (100%♂)</td>
<td>Soil conservation structures re thatching houses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen gardening</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cassava</td>
<td>planting with first rains in February, continuous harvesting on demand (♀ only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land preparation</td>
<td>First 25% ploughing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>---harvest---</td>
<td>planting (♀50%♂50%)</td>
<td>weeding (♀♂1x)</td>
<td>---weeding maize (♀♂2x)---</td>
<td>---harvest maize---</td>
<td>plant weeding (♀♂2x)---</td>
<td>---harvest---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorghum</td>
<td>---harvest---</td>
<td>planting (100%♀)</td>
<td>weeding (♀♂1x)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger millet</td>
<td>planting (100%♀)</td>
<td>weed</td>
<td></td>
<td></td>
<td></td>
<td>---harvest---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>Plant (intercropped with maize) (♀♂50/50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>---harvest---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundnuts</td>
<td>planting (♀♂50%♂50%)</td>
<td>weed (♀♂2x)</td>
<td>---harvest---</td>
<td></td>
<td></td>
<td>---planting--</td>
<td>---weeding (♀♂2x)---</td>
<td>---Harvest---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soya beans</td>
<td>---planting---</td>
<td>---weeding---</td>
<td>---harvest---</td>
<td></td>
<td></td>
<td>---planting--</td>
<td>---weeding (♀♂2x)---</td>
<td>---harvest---</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>planting (♀50%♂50%)</td>
<td>---weeding (♀♂100%)---</td>
<td></td>
<td></td>
<td></td>
<td>---harvesting sweet potatoes (meal by meal), (♀♂100%)---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green grams</td>
<td>---planting--</td>
<td>---weeding---</td>
<td>---harvesting---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools in use</td>
<td>hoe</td>
<td>hoe</td>
<td>hoe</td>
<td>small hoe</td>
<td>hands for beans</td>
<td>knives for sorghum, finger millet</td>
<td>hoe</td>
<td>hoe</td>
<td>hoe, spade, sickle</td>
<td>hoe</td>
<td>knife hand</td>
<td></td>
</tr>
<tr>
<td>Group activities</td>
<td>women and men dig in groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diseases</td>
<td>sneezing, eye problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV / AIDS</td>
<td>The group accepted that HIV / AIDS is among them and has seriously affected the labour availability and family resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

10) Famine in May and November because maize and sorghum not yet available yet; beans and groundnuts alone are not considered a full meal.
## APPENDIX 9: PROFILE OF HOUSEHOLDS IN SWARRA, RARIEDA DIVISION, BONDO DISTRICT

<table>
<thead>
<tr>
<th>Composition of households in SWARRA</th>
<th>Maried HHs</th>
<th>Female-headed HHs</th>
<th>Male-headed HHs (no wife)</th>
<th>Grandparent-headed HHs</th>
<th>Orphan-headed HHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of HHs in community</td>
<td>55-60% of total HHs</td>
<td>25-30% of total HHs</td>
<td>A few (1% total)</td>
<td>A few (2% total)</td>
<td>10% of total HHs</td>
</tr>
<tr>
<td>Household composition</td>
<td>husband aged 40 – 45 years wife, 5 children</td>
<td>widow aged 30 – 35 years</td>
<td>widower aged 40 – 50 years</td>
<td>grandmother over 60 years old</td>
<td>3 – 4 children</td>
</tr>
<tr>
<td></td>
<td>1 – 2 orphans</td>
<td>4 of her own children</td>
<td>3 – 4 children</td>
<td>3 orphans</td>
<td>oldest child 15 – 16 years</td>
</tr>
<tr>
<td>Land holding</td>
<td>3 acres</td>
<td>3 acres</td>
<td>3 acres</td>
<td>3 acres</td>
<td>3 acres</td>
</tr>
<tr>
<td>Land utilisation</td>
<td>Cultivate 2 acres/season (2 seasons pa if short rains are good)</td>
<td>Cultivate 1 acre per season</td>
<td>Cultivate 1 acre per season</td>
<td>Cultivate 1 acre per season</td>
<td>Cultivate 1 acre per season</td>
</tr>
<tr>
<td>Cropping patterns</td>
<td>Maize, sorghum, beans, peas, cassava, mango, citrus, pawpaw</td>
<td>Maize, sorghum, beans, peas, cassava, mango, citrus, pawpaw</td>
<td>Maize, sorghum, beans, peas, cassava, mango, citrus, pawpaw</td>
<td>Maize, sorghum, beans, peas, cassava, mango, citrus, pawpaw</td>
<td>Grown for home consumption and small quantity for sale</td>
</tr>
<tr>
<td></td>
<td>Grown for home consumption and small quantity for sale</td>
<td>Grown for home consumption and small quantity for sale</td>
<td>Grown for home consumption and small quantity for sale</td>
<td>Grown for home consumption and small quantity for sale</td>
<td>Grown for home consumption and small quantity for sale</td>
</tr>
<tr>
<td>Livestock</td>
<td>Oxen (4), donkeys (some have 1 or 2 most have none), cows (1 – 2), cattle (6 – 8), goats (10), sheep (7), poultry (15 – 20), beehives (1 – 4)</td>
<td>Cattle (2 – 3), goats (3), poultry (15)</td>
<td>Oxen (4), donkeys (some have 1), cows (1), cattle (4 – 6), goats (3 – 5), poultry (10)</td>
<td>Poultry (10)</td>
<td>Poultry (10)</td>
</tr>
<tr>
<td>Use of farm power</td>
<td>Land preparation: 55% HHs hire DAP, 25% own DAP, 10% family + hired labour, 10% family labour</td>
<td>Land preparation: 55% HHs hire DAP, 35% family labour, 10% family + hired labour</td>
<td>Land preparation: 55% HHs hire DAP, 20% own DAP, 15% family labour, 10% family + hired labour</td>
<td>Land preparation: 90% HHs family labour, 10% hire DAP</td>
<td>Land preparation: 100% HHs family labour</td>
</tr>
<tr>
<td></td>
<td>Weeding: 60% family labour, 40% family + hired labour</td>
<td>Weeding: 90% family labour, 10% family + hired labour</td>
<td>Weeding: 60% family labour, 40% family + hired labour</td>
<td>Weeding: 90% family labour, 10% family + hired labour</td>
<td>Weeding: 100% family labour</td>
</tr>
<tr>
<td></td>
<td>Harvesting: 90% family labour, 10% family + hired labour</td>
<td>Harvesting: 90% family labour, 10% family + hired labour</td>
<td>Harvesting: 60% family labour, 40% family + hired labour</td>
<td>Harvesting: 90% family labour, 10% family + hired labour</td>
<td>Harvesting: 100% family labour</td>
</tr>
<tr>
<td>Composition of households in SWARRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maried HHs</td>
<td>Female-headed HHs</td>
<td>Male-headed HHs (no wife)</td>
<td>Grandparent-headed HHs</td>
<td>Orphan-headed HHs</td>
<td></td>
</tr>
<tr>
<td>Farm tools and implements</td>
<td>2 heavy digging hoes, 5 light weeding hoes, 1 – 2 narrow planting hoes, very few forked jembes</td>
<td>1 heavy digging hoe, 2 light weeding hoes, 1 narrow planting hoe</td>
<td>Data not available</td>
<td>4 light weeding hoes, 1 narrow planting hoe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 pangas, 1 axe, not many HHs have slashers</td>
<td>1 panga</td>
<td>Data not available</td>
<td>1 panga</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 – 50% HHs have ox plough, very few have ox cart</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>very few sprayers for livestock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1% HHs have treadle pump</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other livelihood strategies</td>
<td>kiosks (selling soap, tea leaves, sugar, paraffin) - husband, wife, children</td>
<td>kiosk (if already established whilst husband was alive)</td>
<td>cattle herding</td>
<td>kiosk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>trading in fish, fish smoking – wife</td>
<td>trade in omena (dry and sell whitebait)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>jua kali – husband</td>
<td>casual labour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>building construction – husband</td>
<td>local brew (last resort)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>casual labouring: slashing – husband, weeding – wife, husband, children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>local brew - wife</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livelihood activities (ranked in order of significance for each group)</td>
<td>Farming: 100% HHs</td>
<td>Farming: 100% HHs</td>
<td>Farming: 100% HHs</td>
<td>Farming: 100% HHs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Casual labouring (weeding): 40 – 50% HHs</td>
<td>Casual labouring (weeding): 50 – 60% HHs</td>
<td>Cattle herding: 20 – 25% HHs</td>
<td>Casual labouring: 100% HHs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kiosks: 10 – 15% HHs</td>
<td>Kiosks: 30% HHs</td>
<td>Kiosks: 10% HHs</td>
<td>Casual labouring: 80 – 90% HHs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fish trade: 10% HHs</td>
<td>Omena trade: 10% HHs</td>
<td>Local brew: 5% HHs</td>
<td>Housemaids: 50% HHs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Kiosk: 5% HHs</td>
<td></td>
</tr>
</tbody>
</table>
## APPENDIX 10: PROFILE OF HOUSEHOLDS IN SIBALE, FUNYULA DIVISION, BUSIA DISTRICT

<table>
<thead>
<tr>
<th>Composition of households in Sibale</th>
<th>Married HHs</th>
<th>Female-headed HHs</th>
<th>Male-headed HHs (no wife)</th>
<th>Grandparent-headed HHs</th>
<th>Orphan-headed HHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of HHs in community</td>
<td>65% of total HHs</td>
<td>20% of total HHs (although this figure may be as high as 40% if include wives who are inherited by brother in law as FHHS rather than married HHs)</td>
<td>A few (8% of total HHs)</td>
<td>A few (5% total HHs)</td>
<td>Very rare (2% of total HHs)</td>
</tr>
<tr>
<td>Household composition</td>
<td>• both parents, 3 – 5 children</td>
<td>• 5 – 7 of her own children</td>
<td>• 4 – 5 of his own children</td>
<td>• 4 – 6 grandchildren</td>
<td>• 5 children</td>
</tr>
<tr>
<td></td>
<td>• occasionally 1 – 2 orphans</td>
<td>• rare to have orphans</td>
<td>• may find it difficult to get a new wife if they dislike children of previous wife</td>
<td>• mainly grandmothers but may occasionally include grandfathers</td>
<td>• oldest aged 16 – 18 years</td>
</tr>
<tr>
<td></td>
<td>• head aged 25 – 40 years</td>
<td>• aged 30 – 35 years</td>
<td>• aged 45 – 50 years</td>
<td>• aged 65 – 70 years</td>
<td></td>
</tr>
<tr>
<td>Land holding</td>
<td>average of 4 – 5 acres</td>
<td>if land allocated prior to husband’s death, have up to 4 acres if land not allocated, vulnerable to land grabbing by relatives</td>
<td>average of 4 – 5 acres</td>
<td>smaller area because already allocated land to children</td>
<td>average 4 – 5 acres</td>
</tr>
<tr>
<td>Land utilisation</td>
<td>• if have small area, cultivate it all</td>
<td>• if husband used to assist with digging, may have more fallow after his death</td>
<td>• may have more fallow</td>
<td>• area cultivated depends on strength of grandparents and age of grandchild to assist</td>
<td>• do not have means to open up much land hence more fallow</td>
</tr>
<tr>
<td></td>
<td>• if have large area, cultivate larger proportion in long rains and smaller proportion in short rains</td>
<td>• some occasionally rent out land</td>
<td>• two crops a year</td>
<td>• two crops a year</td>
<td>• some rent out land</td>
</tr>
<tr>
<td></td>
<td>• may have fallow if have &gt; 1.5 acres</td>
<td>• younger women may cultivate up to 75% of area used to cultivate when husband was alive</td>
<td>• two crops a year</td>
<td>• two crops a year</td>
<td>• two crops a year</td>
</tr>
<tr>
<td></td>
<td>• two crops a year</td>
<td>• two crops a year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cropping patterns</td>
<td>• cassava, sorghum, maize, sweet potatoes, groundnuts, beans, cowpeas, bananas</td>
<td>• less diverse cropping pattern after husband died</td>
<td>• cassava, sorghum, maize, sweet potatoes, groundnuts, beans, cowpeas, bananas</td>
<td>• cassava, sorghum, maize, sweet potatoes, groundnuts, beans, cowpeas, bananas</td>
<td>• similar range of crops to other HHs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• concentrate on staples (maize, sweet potatoes, cassava, beans)</td>
<td>• area cultivated depends on strength of grandparents and age of grandchild to assist</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• reduce finger millet and cotton (soil fertility had declined, also labour intensive)</td>
<td>• two crops a year</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• stop growing green grams and sesame (cash crops for women)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• stop growing tomatoes (cash crop for men)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock</td>
<td>• cattle (1 – 2), goats (1 – 2), sheep (1 – 2), chicken (6 +)</td>
<td>• some have no livestock – sold to raise cash for husband’s medical treatment, slaughtered during funeral, sold for cash for own medical treatment</td>
<td>• cattle (1), goats (3), sheep (4 – 5), chicken (20)</td>
<td>• tradition of keeping livestock and when both grandparents were alive and strong would have had: cattle (3 – 4), goats (5 – 6), sheep (6 – 8), chicken (10).</td>
<td>• not easy for orphans to keep livestock because people know they are alone and may steal their livestock</td>
</tr>
<tr>
<td></td>
<td>• fishponds (8 HHs)</td>
<td>• lack skills in animal husbandry (husband usually in charge of livestock) and animals die</td>
<td>• more focused on livestock because he is alone</td>
<td>• grandmothers alone: nothing</td>
<td>• 1 – 2 chicken, a few rabbits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• livestock are time consuming</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3 – 4 chicken</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Composition of households in Sibale

<table>
<thead>
<tr>
<th>Labour groups for digging, planting and weeding</th>
<th>Membership of groups increases after husband’s death</th>
<th>Data not available</th>
<th>Elderly women leave labour groups because become weak due to old age</th>
<th>Data not available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married HHs</td>
<td>mainly women, men also belong</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female-headed HHs</td>
<td>Membership of groups increases after</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male-headed HHs (no wife)</td>
<td>husband’s death</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grandparent-headed HHs</td>
<td>Some HHs own a file</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orphan-headed HHs</td>
<td>Data not available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- hoe: 1 per HH member</td>
<td>Data not available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 2 slashers, 2 – 3 pangas, 0 – 2 axes (one for husband, one for wife to split wood)</td>
<td>Data not available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 30% HHs own a file</td>
<td>Data not available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- a few HHs have: rake, shovel, wheelbarrow</td>
<td>Data not available</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Farm tools and implements

- **hoe:** 1 per HH member
- **2 slashers, 2 – 3 pangas, 0 – 2 axes (one for husband, one for wife to split wood)**
- **30% HHs own a file**
- **a few HHs have: rake, shovel, wheelbarrow**

### Other livelihood strategies

- **trading in livestock (men), crop produce (wives sell small quantities of surplus food crops to generate cash)**
- **fishmongers – women**
- **kiosks – women**
- **handicrafts – women**
- **casual labour some men, mainly women (digging, fetching water, firewood)**
- **formal employment - men**

### Livelihood activities (in order of importance)

- **crops, livestock**
- **25% HHs involved in other businesses**
- **crops, fish mongering, trading (buying and selling maize and tomatoes)**
- **crops, livestock rearing, trading in livestock**
- **trading in LS, crops**
- **crops, chickens and rabbits, casual labour**

### Group membership

- **FFS members**
- **Merry-go-rounds**
- **widows’ groups (farming and welfare – help with funerals)**
- **do join groups**
- **tend not to join groups because lack energy**
- **tend not to join groups because wastes their time**

### Food self sufficiency

- **food self sufficient: 8 months**
- **after harvest: 3 meals: breakfast (sorghum porridge), lunch and supper (greens + cassava ugali)**
- **during hungry period (Dec – May): 2 meals: lunch and supper**
- **food self sufficient: 3 – 6 months**
- **after harvest: 2 meals: lunch and supper**
- **during hungry period: 1 meal**
- **food self sufficient: 5 – 6 months**
- **food self sufficient: 0 – 4 months**
- **receive assistance from married children in village**
- **food self sufficient: 1 – 2 months**
- **eat with relatives/neighbours**
- **others and return home in evening**

- **handicrafts – broom handles, ropes, casual labourers**
### APPENDIX 11: PROFILE OF HOUSEHOLDS IN NANDAFUBWA, NAMBALE DIVISION, BUSIA DISTRICT

#### Composition of households in Nandafubwa

<table>
<thead>
<tr>
<th></th>
<th>Married HHs: polygamous</th>
<th>Married HHs: monogamous</th>
<th>Female-headed HHs</th>
<th>Male-headed HHs (no wife)</th>
<th>Orphan-headed HHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of HHs in community</td>
<td>27% of HHs</td>
<td>41% of HHs</td>
<td>17% of HHs</td>
<td>10% of HHs</td>
<td>3% of HHs</td>
</tr>
</tbody>
</table>
| Household composition     | • most usual to have 2 wives  
  • 4 own children, 2 – 3 orphans per wife  
  • head aged 45 – 50 years | • 6 own children, 1 – 2 orphans  
  • head aged 25 – 30 years | • widows from both polygamous and monogamous marriages  
  • 4 – 5 own children  
  • rarely have orphans  
  • aged 25 – 30 years | • 2 children, no orphans  
  • aged 20 – 35 years  
  • usually remarry after a short time | • 3 children  
  • oldest aged 15 – 18 years |
| Land holding              | 10 acres in total | 3 acres | 4 acres | 5 acres | 4 – 5 acres |
| Land utilisation          | • 5 acres sugarcane (contract with husband)  
  • 1 acre per wife of food crops (groundnuts, sorghum, maize, finger millet, cassava, sweet potatoes)  
  • 3 acres fallow (use as livestock pasture) | • 1 acre sugarcane  
  • 1.5 acres food crops (groundnuts, sorghum, maize, finger millet, cassava, sweet potatoes)  
  • 0.5 acre fallow | • 1 – 2 acres sugarcane (change ownership of contract)  
  • 1 acre food crops (groundnuts, sorghum, maize, finger millet, cassava, sweet potatoes)  
  • 1 acre fallow  
  • some have up to 10 acres but only manage 1 – 2 acres food crops, rest fallow or sugarcane | • 1 – 2 acres sugarcane  
  • 0.5 acre food crops (maize, groundnuts) (small area and limited range because usually grown by women)  
  • 2.5 acres fallow | • no sugarcane (can’t get contract unless over 18 years, haven’t got money to hire labour for planting and weeding)  
  • 0.5 acre food crops (maize, groundnuts)  
  • 4.5 acres unused (occasionally rent out) |
| Livestock                 | 3 – 4 cows, 1 – 2 oxen (in 30% HHs), 2 – 3 sheep and goats, 10 chicken | 2 cows, 2 sheep and goats, 5 chicken | May have 1 cow, rare to have sheep and goats  
  2 – 3 chicken | 2 – 3 cows, 1 goat or sheep, 10 chicken | 5 chicken, 2 rabbits |
| Methods of land preparation for food crops | 60% HHs family labour only (many wives and children), 20% DAP hire, 10% DAP own, 10% hire labour | 50% DAP hire, 20% family labour, 20% welfare groups, 10% hire labour | 50% welfare groups, 40% family labour, 10% hire labour | 60% hire DAP, 20% own DAP, 10% family labour, 10% hire labour | 100% family labour |

---

*Balance of households (2%) are headed by grandparents*
<table>
<thead>
<tr>
<th>Other livelihood strategies</th>
<th>Married HHs: polygamous</th>
<th>Married HHs: monogamous</th>
<th>Female-headed HHs</th>
<th>Male-headed HHs (no wife)</th>
<th>Orphan-headed HHs</th>
</tr>
</thead>
</table>
| • husbands: work hard because have many to support: cutting sugarcane, small trade (eg fish)  
• wives: also busy because often struggle alone because husbands not there all the time: sell food crops (maize, cassava), casual labouring on farm work | • husband: less active than polygamous husbands; engage in sugarcane and trading  
• wife: least active in off farm activities because have husband | • most active – after husband dies becomes involved in hotels (making porridge, tea), sell food crops (looking for income to feed children), work in labour groups and hire themselves out, casual labour  
• daughters sent to work as housemaids | • fewer off farm activities so has a lot of work with HH tasks now wife died | • over 18 years old work sugarcane cutting  
• girls – housemaids  
• boys cattle herding  
• both casual labour  
• difficult to stay on at school because need money |

<table>
<thead>
<tr>
<th>Livelihood activities (ranked in order of importance)</th>
<th>Food crops, livestock, sugarcane, off-farm activities</th>
<th>Food crops, livestock, sugarcane, off-farm</th>
<th>Food crops, off farm, sugarcane</th>
<th>Food, livestock, sugarcane</th>
<th>Off farm, rabbits and chicken, food</th>
</tr>
</thead>
</table>
| Group membership                                       | • wife: least active because may be difficult to get husbands to pay membership fee  
• husband: more active because has to prove his worth (join church groups to ensure get buried when die), administrators’ group | • wives: second most active  
• husbands: less active members of self help groups – still young so have energy to participate | • many belong to labour welfare groups (to help each other and hire out their labour)  
• most active in labour groups – want to help children  
• merry-go-rounds, church groups (pay 10/= per month towards funerals and spiritual support) | • not easy to belong to groups because busy at home | • not belong to any groups – not stable, work outside the home |

| Food self sufficiency | 5 months | Whole year | 4 – 5 months | 2 months | Can’t determine  
Sometimes dependent on handouts  
May get food from a group if mother had belonged to a group |
## APPENDIX 12: COMPARISON OF THE DAILY ACTIVITIES OF MARRIED WOMEN AND FEMALE HEADED HOUSEHOLDS IN NANDAFUBWA, NAMBALE DIVISION, BUSIA DISTRICT

<table>
<thead>
<tr>
<th>Daily activities for married women</th>
<th>Time</th>
<th>Daily activities for FHHs</th>
</tr>
</thead>
</table>
| Wake up                           | 05.00| Wake up, pray, wash the face  
| Get children ready for school     |      | Go to shamba              |
| No breakfast                      |      |                          |
| Go to field:                      | 06.00| Weeding own *shamba* or casual labouring  
| • weed in groups (Monday,  
  Wednesday, Friday)              |      |                          |
| • weed own shamba (on other days) |      |                          |
| • weed for payment in kind (food) |      |                          |
| Collect water from protected spring in swamps | 10.00 | Return home  
|                                     |      | Sweep the home and clean compound  
|                                     | 10.30| Make porridge              |
| Look for wild vegetables          | 11.30| Fetch water               |
| Go to grinding mill (1 km)        | 12.00| Fetch vegetables within the homestead  
| Cook food                         | 12.30| Prepare lunch (ugali, merere, cowpea leaves, kale, amaranths)  
| Eat lunch with children back from school | 13.00 | Lunch (women who return late from shamba either eat last night’s leftovers or nothing)  
|                                   | 13.30 | Rest (some older women rest all afternoon)  
| Bathe at swamp                    | 14.00| Some of the following:  
| Collect water (2 journeys)        |      | • fetch water; fetch vegetables; wash utensils and clothes  
| Fetch firewood from forest near swamp | 15.00 | • return to *shamba* for more weeding (if under contract)  
| Weed                              | 16.00| • attend church/other groups (twice a week)  
| Look for vegetables               | 17.00| Bathe  
| Cook                              |      | Cook supper (*ugali,* vegetables)  
| Bathe small children at home      | 17.30| Supper  
| Cook                              | 18.00| Talk to children and grandchildren  
| Eat supper (*ugali* and vegetables)| 19.00| Put small children to bed  
| Rest                              | 19.30| Rest  
| Go to bed                         | 21.00| Pray, sleep |

Information collected from separate groups of married women and FHHs
APPENDIX 13: SOURCES OF INCOME AND PATTERNS OF EXPENDITURE, NANDAFUBWA, NAMBALE DIVISION, BUSIA DISTRICT

Sources of Income by Household Type

<table>
<thead>
<tr>
<th>Married households</th>
<th>FHHs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Husbands</strong></td>
<td><strong>Wives</strong></td>
</tr>
<tr>
<td>1. hire out labour</td>
<td>1. hire out labour</td>
</tr>
<tr>
<td>2. hire out ox</td>
<td>2. sell food crops</td>
</tr>
<tr>
<td>plough/DAP hire</td>
<td>3. sell chicken</td>
</tr>
<tr>
<td>3. sell livestock (cows, goats)</td>
<td>4. plant and sell vegetables</td>
</tr>
<tr>
<td>4. small business</td>
<td>5. sell milk</td>
</tr>
<tr>
<td></td>
<td>6. small business</td>
</tr>
</tbody>
</table>

1 = most important

Information collected from separate groups of married women (reporting on themselves and their husbands) and FHHs

Items of Expenditure by Household Type

<table>
<thead>
<tr>
<th>Married households</th>
<th>FHHs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Husbands</strong></td>
<td><strong>Wives</strong></td>
</tr>
<tr>
<td>1. school fees and uniforms</td>
<td>1. salt, paraffin, matches, cooking fat, soap</td>
</tr>
<tr>
<td>2. food – maize, cassava</td>
<td>2. dresses</td>
</tr>
<tr>
<td>3. medicines for family</td>
<td>3. grinding mill</td>
</tr>
<tr>
<td>4. drink</td>
<td>4. body lotions</td>
</tr>
<tr>
<td>5. hiring labour</td>
<td>other: tomatoes, onions, hiring labour, drink</td>
</tr>
<tr>
<td>other: clothes, grass for thatching houses</td>
<td></td>
</tr>
</tbody>
</table>

1 = most important in terms of amount of money

Information collected from separate groups of married women (reporting on themselves and their husbands) and FHHs
APPENDIX 14: CURRICULUM FOR FARMERS ON LABOUR SAVING METHODS FOR LAND PREPARATION AND WEED MANAGEMENT

<table>
<thead>
<tr>
<th>Theme</th>
<th>Topics</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group dynamics</td>
<td>• group formation, development, roles within a group, important qualities and behavioural patterns, stages of growth, management skills and methods</td>
<td>2 x 4 hour session</td>
</tr>
<tr>
<td></td>
<td>• application of group dynamics theory to achieve food production through adaptive research in farmer field schools</td>
<td>4 hours</td>
</tr>
<tr>
<td>Farm planning</td>
<td>• planning: assessment of resources and constraints, layout, gross margins</td>
<td>4 hours</td>
</tr>
<tr>
<td>Land preparation and planting</td>
<td>• seedbed preparation: depth of furrows, sub-soiling for hard pans</td>
<td>2 x 4 hour sessions</td>
</tr>
<tr>
<td></td>
<td>• seed selection: disease free resistant cassava materials, high yielding varieties, varieties tolerant to <em>S. hermonthica</em>, <em>striga</em> tolerant seeds (maize KSTP 94, sorghum seredo), drought resistant varieties</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• planting: timing, row planting, planting depth, correct spacing along row and between rows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• fertiliser and manure</td>
<td></td>
</tr>
<tr>
<td>Weed management</td>
<td>• timing: weeding at critical times after crop emergence</td>
<td>3 x 4 hour sessions</td>
</tr>
<tr>
<td></td>
<td>• weeding methods to minimize soil disturbance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• options to suppress weeds: manure, mulch, cover crops (for example, <em>Dolichos lablab</em>, sweet potatoes SPK 004), intercropping, rotation</td>
<td></td>
</tr>
<tr>
<td>Farm equipment and tools</td>
<td>• use of appropriate tools for the task</td>
<td>2 x 4 hour sessions</td>
</tr>
<tr>
<td></td>
<td>• quality characteristics of hand tools</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• technology appraisal within farmer field school activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• network with retailers and artisans</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• group bargaining and purchasing</td>
<td></td>
</tr>
<tr>
<td>Conservation farming</td>
<td>• direct planting into cover crops or mulch</td>
<td>2 x 4 hour sessions</td>
</tr>
<tr>
<td></td>
<td>• equipment available: jab planter, Magoye ripper for DAP, sub-soiler, ripper, planter attachment, divert seeder, sprayer</td>
<td></td>
</tr>
</tbody>
</table>

Resource requirements: land, cover crop seeds, *striga* tolerant seeds, cassava planting materials free from cassava mosaic virus, fertilisers, manure, pesticides, range of hand tools for appraisal, posters, pamphlets and other visual aids
APPENDIX 15: CURRICULUM FOR FARMERS, TRANSPORTERS AND ARTISANS ON DAP FOR FARM WORK AND TRANSPORTING

<table>
<thead>
<tr>
<th>Theme</th>
<th>Topics</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>• introduction to the course</td>
<td>1 hour</td>
</tr>
<tr>
<td></td>
<td>• participatory team-building boosters</td>
<td></td>
</tr>
<tr>
<td>Agricultural mechanisation and draft animal power utilisation</td>
<td>• general farm power provision (tillage and transport) with several student generated examples of farm choices available</td>
<td>4 hours</td>
</tr>
<tr>
<td></td>
<td>• ingredients/principles of farm management (labour, power, options in mechanisation, timeliness and operational costing)</td>
<td></td>
</tr>
<tr>
<td>Draft animal husbandry and fodder management</td>
<td>• introduction to work animal husbandry, power generation, and meaning and importance of proper nutrition</td>
<td>2 hours theoretical session</td>
</tr>
<tr>
<td></td>
<td>• animal health management (covering nutrition, welfare, disease control and general management of working animals)</td>
<td>2 hours</td>
</tr>
<tr>
<td></td>
<td>• feed and fodder selection, management and preservation (including appropriate feeding regimes)</td>
<td>2 hours</td>
</tr>
<tr>
<td>Draught animal selection and training (oxen and donkeys)</td>
<td>• work animal characteristics, ox-donkey differences, body conformation criteria, harnessing and carting</td>
<td>2 hour theoretical session</td>
</tr>
<tr>
<td></td>
<td>• duration and timing of training for tillage, transport as pack and pulling carts</td>
<td>2 hour session with small herds of oxen and donkeys to demonstrate selection characteristics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 hour session with a pair of new learners (oxen and donkeys) for DAP training</td>
</tr>
<tr>
<td>Implements, equipment and accessories.</td>
<td>• range of DAP equipment: ploughs, planters, cultivators, harrows, rippers and direct seeders, groundnut lifters etc</td>
<td>2 hour theoretical session with pictorial display of DAP equipment</td>
</tr>
<tr>
<td></td>
<td>• their utilisation, care, assembly, adjustments, maintenance and stripping</td>
<td>4 hour practical session (hands on) on adjustment and use of equipment (both oxen and donkeys should be used by the trainees)</td>
</tr>
<tr>
<td>Transport animals, equipment and accessories</td>
<td>• packing and carting: packing and carting - harnessing, axle placement, loading, braking carts, harnesses, yokes, panniers, sledges</td>
<td>1 hour theoretical session on animal powered transport</td>
</tr>
<tr>
<td></td>
<td>• design parameters, specifications, manufacture and use (artisans and users should be in the class)</td>
<td>2 hour practical session on packing and cart transport</td>
</tr>
<tr>
<td>Conservation tillage agriculture</td>
<td>• environment preservation principles, the context of conservation tillage, the relevance of and practical applications for tillage based soil and water management</td>
<td>4 hour theoretical session</td>
</tr>
<tr>
<td></td>
<td>• conservation tillage equipment, their adjustments, use and maintenance including equipment recently introduced into the country</td>
<td>4 hour practical session</td>
</tr>
</tbody>
</table>

Resource requirements: range of tillage equipment (ploughs, ridgers, planters, cultivators, rippers, direct seeders, sprayers, yokes etc) and transport equipment (two or four-wheel carts, puncture-proof wheels, bearings and axles, panniers, harnesses, hoof trimming gear); posters, pamphlets and other visual aids
## APPENDIX 16: CURRICULUM FOR RURAL HOUSEHOLDERS ON LABOUR SAVING TECHNOLOGIES AND PRACTICES FOR HOUSEHOLD ACTIVITIES

<table>
<thead>
<tr>
<th>Theme</th>
<th>Topics</th>
<th>Duration</th>
</tr>
</thead>
</table>
| Introduction                 | • introduction and group building exercises  
• discussion of causes of firewood as a labour constraint and options to reduce it  
• overview on existing stoves: liner, charcoal and paraffin jiko | 4 hours                                                                 |
| Clay liner                   | • use of liner (lighting firewood, amount of wood, average cooking times for common foods), maintenance  
• advantages and disadvantages of cooking with liner compared to three stones and other stoves  
• purchase and installation of liner – information sources on: quality, what to consider before purchasing and where to buy it, prices, how to install it adequately and safely  
• other design improvements for wood burning stove | 2 x 4 hours (1 theory and 1 practical session) |
| Fireless cooker (insulated basket) | • use of fireless cooker (fuelwood saved, average cooking times for common foods)  
• purchase of fireless cooker or self made: discussion of options  
• making a fireless cooker: materials needed, important aspects to consider  
• purchasing a fireless cooker - quality, size, where to buy and prices | 2 x 4 hours (1 theory and 1 practical session on making the fireless cooker) |
| Tree planting                | • firewood requirements, how can they be met by planting trees  
• guidance on different options (nursery, border planting, agroforestry etc), recommended varieties  
• budgets | 3 x 4 hours (1 theory and 2 practical sessions) |
| Roofwater harvesting         | • advantages, amounts that can be obtained, uses  
• guidance on making and installing gutters, pipes and tanks  
• materials required and costs  
• required maintenance | 2 x 4 hours |
| Solar purification           | • Importance of clean water, advantages of water purification  
• guidance on making a solar water purification bottle  
• materials required and cost  
• use of the solar water purification bottle on a daily basis  
• lifetime and maintenance of a solar water purification bottle | 4 hours |
| Agroprocessing and storage   | • drying: use and maintenance of simple solar driers  
• storage: construction and maintenance of granaries  
• processing: use and maintenance of sheller, grinder, oil press | Time varies depending on the topic selected |

Resource requirements: equipment to be demonstrated, land for tree planting, tree seedlings, posters, pamphlets and other visual aids
## APPENDIX 17: CURRICULUM FOR ARTISANS ON MANUFACTURE OF TOOLS AND EQUIPMENT FOR DAP

<table>
<thead>
<tr>
<th>Theme</th>
<th>Topics</th>
<th>Duration</th>
</tr>
</thead>
</table>
| Artisanal equipment production and servicing | • manufacture of tine-implements, harnessing and other accessories for DAP efficiency covering material sourcing, jig/fixture manufacture, marking, punching/drilling/cutting/shaping  
• assembly and adjustments  
• services and repair | 1.5 weeks  |
| Costing of materials and manufacture | • budgeting  
• timing  
• raw material procurement and costing  
• credit access  
• time-value of money | 2 days  |

Resource requirements: equipment models, take-home jigs and fixtures, simple part and assembly drawings, specialised tools; posters, pamphlets and other visual aids
Training in equipment production requires appropriately equipped workshop
APPENDIX 18: POSTER TO GUIDE FARMERS AND RETAILERS IN PURCHASE OF HOES

BUYING A JEMBE? .......... CONSIDER!

IS THE JEMBE - OK ............... FOR THE JOB!

Consider ........
- Who is going to use it? Men or women? Adults or children?
- How is it going to be used? For ploughing, planting, harrowing or weeding?
- What is the type and condition of soil?
- What crop is to be grown?

BUT.......... IS THE QUALITY OK? A good quality hoe will have:

- **Eye:** a near perfect circle on the inside, clean
- **Rib:** symmetrical in the middle of the hoe, sharp ridge
- **Place of origin:** embossed on blade
- **Material:** forged from one piece of metal
- **Blade:** slightly curved
- **Sound:** characteristic sound when hit with a stone
- **Surface finish:** smooth in texture, metallic blue fade colour

For example:
If it is a 'Cock' brand, consider... A good quality 'Cock' brand hoe will have:
- **Place of origin:** Chinese made hoes will have 'Made in China' embossed on the hoe (Beware: some Indian hoes are also embossed 'Made in China')
- **Logo of cock:** on left side of hoe, facing right
- **Quality of embossing:** high quality with sharp features of logo and lettering
- **Packaging of hoe:** indicative of quality (especially for retailers buying from wholesalers) and may state place of origin

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12 This would be produced in local languages
13 The mentioning of this particular brand does not necessarily imply endorsement of this brand by FAO