Livelihoods of cassava farmers in the context of HIV/AIDS in northern Malawi

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Midori Yajima

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List of Abbreviations

ACMD	African Cassava Mosaic Disease
ADD	Agricultural Development Division
ADMARC	Agricultural Development and Marketing Corporation
AESA	Agro-ecosystem Analysis
AIDS	Acquired Immune Deficiency Syndrome
AISP	Agricultural Input Subsidy Programme
ART	antiretroviral therapy
CBO	Community-based organisation
CGM	Cassava Green Mite
CMB	Cassava Mealybug
EPA	Extension Planning Area
FAO	Food and Agriculture Organisation of the United Nations
FFS	Farmer Field School
FLS	Farmer Life School
FRG	Farmer Research Group
HBC	Home-based care
HIV	Human Immunodeficiency Virus
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
IPM	Integrated Pest Management
JFFLS	Junior Farmer Field and Life Schools
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Volunteers
NAPHAM	National Association of People Living with HIV and AIDS in Malawi
NGO	Non-governmental organisation
OVOP	One Village One Product
PLWHA	People Living With HIV/AIDS
RDP	Rural Development Programme
SAP	Structural Adjustment Programme
SARRNET	Southern Africa Root Crops Research Network
SCFT	Smallholder Coffee Farmers Trust
SSA	Sub-Saharan Africa
SSA	Sub-Saharan Africa
SSI	Semi-structured interview
T&V	Training and Visit
TIP	Targeted Inputs Programme
ToT	Training of Trainers
VCT	Voluntary Counselling and Testing
WFP	United Nations World Food Programme

1 General Introduction

Background

Low agricultural productivity and food insecurity in Sub-Saharan Africa has been recognised for decades. A number of issues have been suggested as particular challenges, such as population pressure, soil fertility depletion, lack of off-farm inputs, and changes in rainfall patterns.

In December 1998, I went to Malawi for the first time to work as a Japan Overseas Cooperation Volunteer (JOCV) with the Japan International Cooperation Agency (JICA). I was assigned to work with Lilongwe East Rural Development Programme (RDP), Lilongwe Agricultural Development Division (ADD) under the Ministry of Agriculture,[1] and worked at an agricultural extension office called *Chitsime* Extension Planning Area (EPA), located in the outskirts of the capital city, Lilongwe.

I worked with agricultural extension workers who were disseminating agricultural technologies to farmers in the surrounding villages. Shortly after I started working at the extension office, I became aware of the lack of training opportunities, resources, and access to information for many of the frontline extension staff, which had a demoralising effect. This led me to compile a resource book (Kusakari and Yajima 2001) together with Yasuko Kusakari and Yuki Kobayashi, my colleagues at JICA/JOCV in Malawi at that time, in order to help close the information gap.

My volunteer work in Malawi led me to question the relevance of extension messages focused on technology transfer and intensification, and made me rethink the role of the public research and extension service system. I also wondered about my role as an outsider in helping to improve the relevance and effectiveness of these services to support smallholder farmers. After the completion of the appointment in Malawi, I returned to Japan and worked for 8 months in Tanzania and then decided to undertake postgraduate study. I got in touch with my prospective supervisors at Wageningen

[1] The Ministry of Agriculture has changed its name from the Ministry of Agriculture and Irrigation to the Ministry of Agriculture and Food Security in 2004, but it is uniformly referred to in this thesis as the 'Ministry of Agriculture'.

University. At the same time, I obtained a research fellowship from JICA for the initial two years. It was an opportunity to begin my PhD study.

Research context

Malawi: country profile

Malawi is a landlocked country located at the south end of the Great Rift Valley in Africa with a total area of 118,480 square kilometres of which Lake Malawi covers 20% (CIA 2009). It is bordered by Zambia to the northwest, Tanzania to the northeast, and surrounded by Mozambique on the east, south and west (Figure 1-1).

Figure 1-1 Map of Malawi

Source: Magellan Geographix 1997/ National Geographic Society/ Microsoft Corporation 2009

Malawi has a sub-tropical climate with a uni-modal rainy season from November to April (when 95% of the annual precipitation takes place), cold-dry season from May to August, and hot-dry season from September to October (Malawi Meteorological Services 2006). In 2008, it had an estimated population of 13.1 million (National Statistical Office of Malawi 2008). It has three administrative divisions: Northern, Central, and Southern Regions. Nearly half (45%) of the population lives in the Southern Region, while 42% lives in the Central Region and 13% in the Northern

Region (National Statistical Office of Malawi 2008). According to the estimate for 2005-2010, the current annual population growth rate is 2.5% (UNDP 2007) and the urbanisation rate is 5.2% per annum (CIA 2009). The economy is largely based on agriculture and 88% of the country's population lives in rural areas (National Statistical Office of Malawi 2005). Malawi has a high population density, estimated in 2008 at 139 people per square kilometre (National Statistical Office of Malawi 2008). This is way beyond the overall mean for Sub-Saharan Africa of 31 people per square kilometre (United Nations Population Division 2009) and outstandingly higher than the neighbouring countries of Tanzania, Zambia, and Mozambique, which have population densities of 41, 16, and 26 per square kilometre respectively (Population Reference Bureau 2006).

Malawi is one of the poorest countries in the world. Its human development index (HDI) in 2008 was ranked 162nd of 179 countries (UNDP 2008). Life expectancy is estimated to be 45 years at birth according to the 2000-2005 estimate (UNDP 2008). In 2005, the infant mortality rate was estimated to be 79 per 1,000 live births and the under-five mortality rate to be 125 per 1,000 live births (UNDP 2008). The adult literacy rate for those over 15 years old was 72% in the 2007 estimate (UNESCO Institute for Statistics 2009). Poverty in Malawi is characterised by severe inequality: nearly half of the available services and commodities are used by 20% of the wealthiest, while the poorest 20% has access to only 6.3% (Frankenberger, Luther et al. 2003). Overall, about 65 % of the population is estimated to live below the national poverty line (UNDP 2007). The HIV prevalence is estimated to be 12% (Office of the President and Cabinet 2007) and has become the leading cause of death in the 15-49 year age group (Malawi National AIDS Commission 2003).

Cropping systems

In Sub-Saharan Africa, maize and cassava are the two most important food crops in terms of calorific intake (Gabre-Madhin and Haggblade 2004; FAOSTAT 2008). In addition, farmers in Malawi typically grow tobacco, cotton, groundnuts, vegetables, pulses, sorghum, bananas, paddy rice, and sweet potatoes (FAO 2002; Kanyama-Phiri et al. 2000; Snapp and Minja 2003; Snapp 2004) on a small-scale for both cash and consumption.

Maize production and food security

In the last century, maize became a dominant crop in Malawi. The consumption per capita has become one of the highest in the world, averaging over 100 kg per person per year (Smale, Heisey et al. 1995; CIMMYT 1998). Maize is grown by 90% of rural households and covers 67-89% of the land area cultivated by smallholder farmers – a dietary staple for more than 75% of the inhabitants (Smale, Heisey et al. 1995; Snapp and Minja 2003).

Scarcity of maize is interpreted in Malawi as a food shortage (FAO 2002). Over the last decade, the production of maize has not always been able to meet the needs of the growing population. Particularly in 2002, the shortage of maize production affected about 3.2 million, one-third of the total population (Chinsinga 2007). The stunting of children under 5 was reported at an average of 49.3%, indicating that hunger is a chronic problem (FAO 2002). In the years of severe food shortage, emergency food relief has been instrumental in supplementing the scarcity of food and compensating for the low purchasing power of the majority of the population (CIMMYT 1998; FAO 2002; FAO 2004).

Intensified maize cropping and production constraints

Over-cultivation, particularly due to population pressure, has led to a decline in soil fertility, thereby necessitating the continuous use of fertilisers. Inorganic fertilisers in the commercial market have become beyond the reach of many farmers because of their high price and this is particularly due to transport costs (Harvard Institute for International Development 1994; Hardy 1998). The availability of credit to smallholders has been limited; over 90% of the smallholder farmers had no access to agricultural credits (Chirwa, Kydd et al. 2006).

Reasons for insufficient maize production

Maize production is highly dependent on reliable unimodal rainfall patterns. Every year, many farmers in rural areas of Malawi experience the so-called ‘hungry season’ during February and March (Devereux 1999; Chinsinga and O’Brien 2008). This is because the farmers run short of maize stocks in the period just before the harvest. According to a survey in 1990, even in years with good rainfall and good harvests of maize, 75-80% of households emptied their granary supplies by December and relied on the market until the next harvest in April or May (Devereux 1997). The situation becomes even more

critical in years with haphazard rainfall patterns leading to poor or early harvests. Diverse coping responses by farming households have been reported and include rationing, diversifying the diet (including resorting to wild plants), migration, and trying to increase cash income by engaging in casual hired labour (called *ganyu*[2]) in order to purchase food (in particular maize) to feed the family (Vaughan 1987). The nutritional level of people declines and, as a result, they become physically weaker and more vulnerable to health problems at the time when agricultural labour demand is at its peak, thereby trapping the poorest in a so-called 'downward spiral' (Drinkwater 2003). Thus, the problems associated with maize production can be attributed to various key factors: erratic rainfall, declining soil fertility due to lack of rotation or fallow (Snapp and Minja 2003), low use of inputs (hybrid seeds and inorganic fertiliser), variable availability of subsidies and credits, and occurrence of pests and diseases (FAO 2002).

Input subsidies

Subsidies for hybrid seeds and fertilisers for maize have been provided in Malawi under several schemes introduced since the 1960s (Chinsinga and O'Brien 2008). Universal input subsidy was provided in the 1960s and 1980s until its removal in 1996. The subsidies were then reintroduced by the Starter Pack Programme between 1998 and 2000, which provided all farmers with free packs of fertiliser, hybrid maize seed and beans or groundnuts seeds. Cutbacks to the Starter Pack Programme and inappropriate management of the strategic grain reserve (Devereux 2002) aggravated the food crisis in 2002 (FAO 2002; Chinsinga and O'Brien 2008). This was followed by the Targeted Inputs Programme (TIP) and extended TIP in 2002-2005 to respond to the crisis. Thereafter, the Agricultural Input Subsidy Programme (AISP), which was based on vouchers, was implemented in 2005-2007 to provide fertilisers for tobacco and maize (Chinsinga and O'Brien 2008). Subsidised seeds and fertilisers had a major impact on maize production, lifting yield by up to three times of that achieved under traditional practices in good rainfall years (Carr 1997).

The frequent changes in input subsidy policies and the rising cost of fertilisers have posed additional production constraints for smallholder farmers in Malawi, particularly since the 1990s. The production was further affected by the privatisation of seed

[2] Terms in local languages in this thesis are with my translation, unless otherwise indicated.

companies, which induced the price hike (ActionAid International 2006), and the privatisation of the state marketing board in Malawi (Agricultural Development and Marketing Corporation [ADMARC]), which resulted in closure of some of the outlets (AFRODAD 2007). Due to these institutional constraints, coupled with erratic rainfall patterns, Malawi's maize production has been volatile (Figure 1-2). Since 2000, unstable maize production has distorted the maize market price (Snapp and Minja 2003; ActionAid International 2006).

The AISP programme based on vouchers targeted poor farmers. Although yield level and production of maize has fluctuated over the last two decades, it has shown a spike since the introduction of the voucher system in 2005-2007 and favourable rains in subsequent years. The AISP programme has proved so far to be a success, yielding a record surplus production of over one million metric tons of maize in 2007 (USAID 2007).

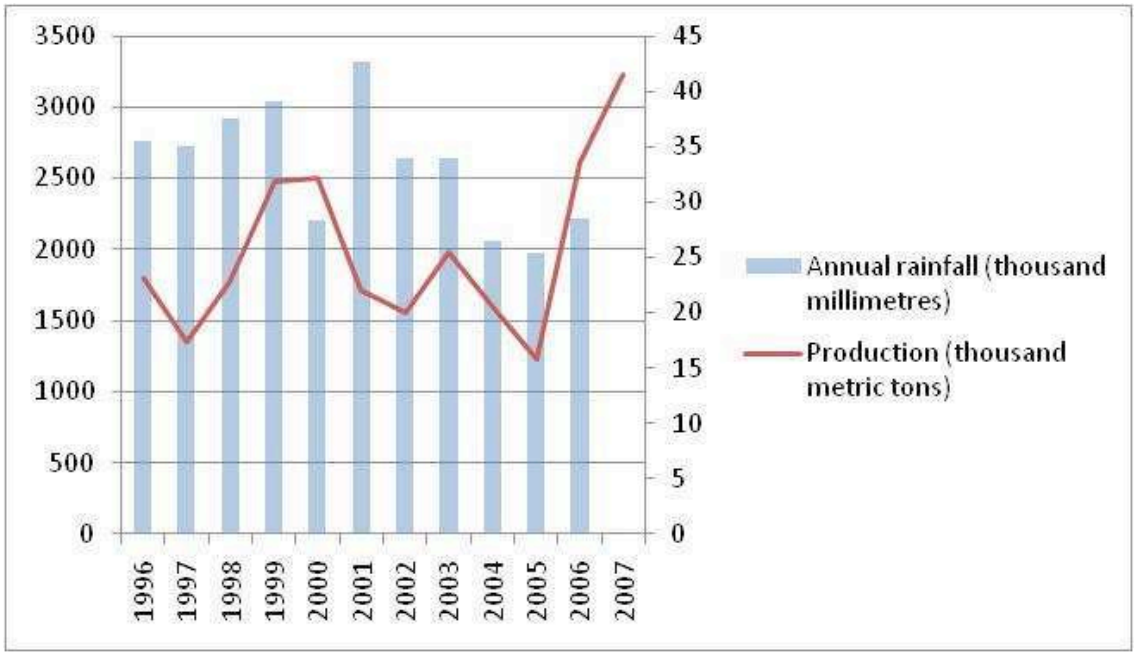

Figure 1-2 Yearly production of maize in Malawi from 1987 to 2007.
Source: FAOSTAT 2009; National Statistical Office of Malawi 2009
Note: rainfall data for 2007 were unavailable.

Agricultural policy focus

In 2006-2007, nearly half of the Ministry of Agriculture's budget was allocated to the AISP input subsidy scheme (Chinsinga and O'Brien 2008). The focus of the public agricultural extension service is on improving maize yield with the use of off-farm

inputs (Shah, Osborne et al. 2002; Snapp 2004; Chirwa, Kydd et al. 2006). The key issue is how to improve and maintain the production and availability of maize as the most important staple food crop, including the evaluation of input subsidy schemes, management of the strategic grain reserve, and import and export policies. Despite the improvements in input subsidy schemes, food insecurity has persisted. Even though the input subsidy will continue to be an important pillar of political imperatives, it remains to be seen if the system will be sustainable when a poor rainfall season strikes the region.

Cassava in Malawi

Cassava (*Manihot esculenta* Crantz) is a perennial woody shrub native to South America that was introduced to Africa in the 16th century by the Portuguese and Arab traders and is now commonly grown in nearly all parts of Africa (Carter, Fresco et al. 1997). Grown in tropical and subtropical areas, cassava yields edible roots, propagated by stem cuttings and is relatively tolerant to water stress and low-nutrient soils. The tubers can be harvested between 6 and 36 months after planting (IITA 2009).

Cassava in Malawi is traditionally grown as a staple food in the lakeshore region in the north and Blantyre Shire Highlands areas in the south and has increasingly become important in the last few decades (Smale, Heisey et al. 1995; CIMMYT 1998; Benesi, Moyo et al. 2001; Snapp and Minja 2003). In the lakeshore and northern regions, people process bitter varieties to remove the cyanogenic glucosides as they prepare flour for *nsima* (porridge), which is the main component of their daily diets.

Cassava production surge

Cassava production in Malawi increased dramatically from 170 thousand to over 3 million metric tons in the two decades between 1987 and 2007 (Figure 1-3), while maize production increased from 1.2 to 3.2 million metric tons over the same period (FAOSTAT 2008). By 2007, Malawi had become the 15th largest producer of cassava in quantity in the world (FAOSTAT 2008). Even though cassava consumption has been traditionally regarded as a sign of lower social welfare and income status (Cock 1985; Prudencio and Al-Hassan 1994), in Southern and Central Regions of Malawi, where the population density and urbanisation rate is higher, cassava has gradually gained importance as a food to supplement shortfalls of maize production and is increasingly grown in peri-urban areas as a cash crop, as more people have started consuming

cassava instead of maize (Hillocks 2002a). This movement has been enhanced by dissemination efforts to distribute improved varieties and is supported by the government and international organisations to promote cassava production for food as well as for cash and as an industrial crop (SARRNET 2002).

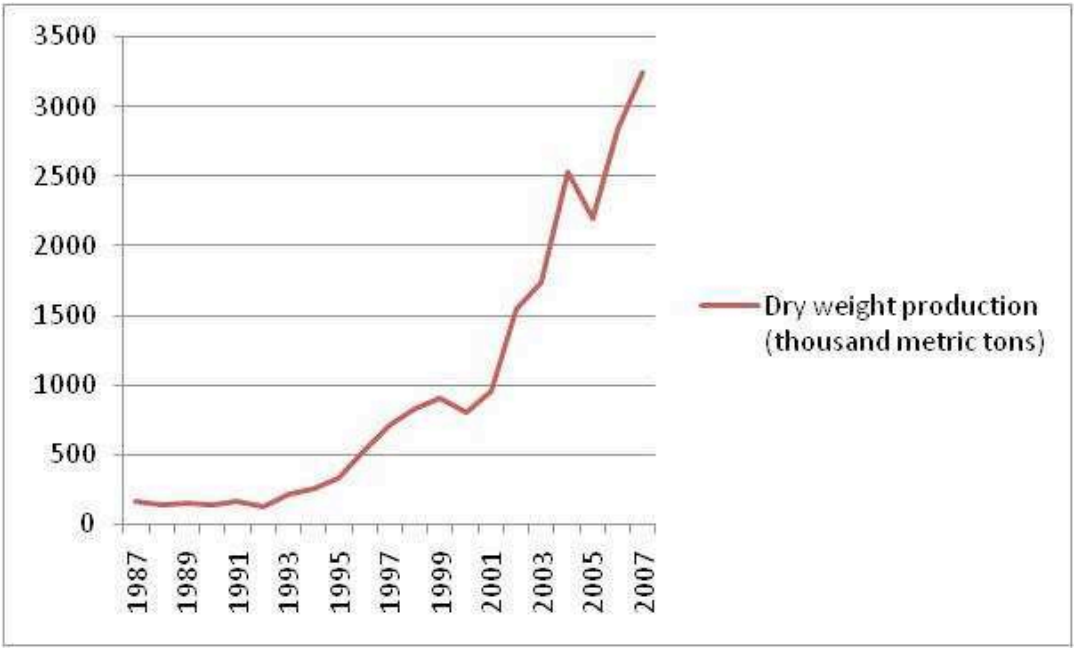

Figure 1-3 Yearly production of cassava in Malawi from 1987 to 2007
Source: FAOSTAT 2009
Note: the official production estimates for 2000 and 2001 were adjusted based on the recommendation by FAO mission (FAO 2002; Haggblade and Zulu 2003).

The potential use of cassava

Some farmer organisations have demonstrated the potential to process cassava into value-added food products (Chiwona-Karltun, Kambewa et al. 2005; OVOP 2006; CTA 2008). It also has potential in a variety of industrial sectors: confectioneries (such as a partial substitute for wheat flour in biscuits and as a source of glucose), bakeries and breweries, timber, textiles, packaging, pharmaceuticals, batteries, and paper making (Benesi, Moyo et al. 2001; Balagopalan 2002; SARRNET 2002; USAID 2002). An optimistic estimation of the demand is that it could increase seven times above the supply in 2002 (USAID 2002). With a prospective application as a biofuel (Sielhorst, Molenaar et al. 2008; Fermont 2009), there is a potential to develop cassava as a high-value foreign exchange earner, at a time when conventional Asian exporters have been facing challenges due to the rising cost of production to meet the demand of the

European market (Hillocks 2002a). Thus, cassava growing can be profitable due to its potential to be commercialised at a larger scale.

HIV/AIDS situation

The overall national prevalence of HIV in Malawi was estimated to be 12% in the 2007 sentinel surveillance survey (Office of the President and Cabinet 2007). The HIV prevalence among rural populations aged 15-49 years ranged from 10 to 15% and, of the urban population, from 19 to 28% (Malawi National AIDS Commission 2003). In recent years, it has been reported that the gap between rural and urban populations is narrowing (Office of the President and Cabinet 2007). Geographically, the Southern Region has been stricken most heavily and the prevalence is nearly twice as much as the average of the Central and the North Regions combined (Malawi National AIDS Commission 2003). In addition, the negative association of AIDS progression and therapy with tuberculosis, diabetes, malaria and malnutrition have been reported (Valcour, Shikuma et al. 1999; Justman, Benning et al. 2003; Yoon, Gulick et al. 2004; Anabwani and Navario 2005; Kublin, Patnaik et al. 2005; Whitworth and Hewitt 2005; WHO 2005; UNAIDS 2006).

The socioeconomic impact HIV/AIDS

For society as a whole, the impact of AIDS has both economic and social implications; the most significant is labour loss, resulting in a decline in agricultural productivity (Shah, Osborne et al. 2002; Drinkwater 2003). Women, who provide an important part of subsistence agricultural labour, account for 56.4% of infected adults (Garbus 2003). The number of orphans in Malawi have been estimated to be over 1 million and half of these were considered to be due to AIDS (Office of the President and Cabinet 2007). Another 30,000 children have been estimated to have one or both parents suffering from AIDS (Malawi National AIDS Commission 2003). Additional burdens on households, such as care for orphans and the sick, are often borne by women and, as a result, they become more vulnerable to other livelihood shocks (Baylies 2002). It has been argued that AIDS has resulted in an increased frequency of change in marriage partners and the displacement of orphaned children (possibly exposing them to labour exploitation or trafficking), thereby leading to the erosion of economic competence and social unity in rural communities (Bryceson 2003; Drinkwater 2003). An increasing number of grandparents look after their grandchildren, or households are child-headed, depriving the children of the opportunity to advance in formal education and to learn

agricultural knowledge and skills from their parents (Oxfam International 2002).

The impact HIV/AIDS on agriculture and food security

The impacts of AIDS clearly worsen the food security of rural households (Müller 2004). Specific effects include a shift to less labour intensive crops, which is one of the responses households make when faced with labour shortages resulting from AIDS (Chapter 3). The rise in cassava production in Malawi could be taken as a symptom of such an induced shift (de Waal and Tumushabe 2003). Other reported responses include late planting and compromising on soil conservation activities (de Waal and Tumushabe 2003). The public agricultural extension services have become even more over-strained and under-resourced due to the AIDS epidemic (Topouzis 1999). Various suggestions for reducing the impacts are being mainstreamed in the policies of ministries and donors (Ngwira, Bota et al. 2001; Niehof and Price 2008). However, the capacity for implementation is still limited. There is a general failure of the agricultural sectors in AIDS-affected developing countries to respond actively to AIDS because of a lack of capacity and political will, as well as a lack of empirical data to guide agricultural policy makers (Wiegers 2008).

'New Variant Famine' hypothesis

The 'New Variant Famine' hypothesis argues that AIDS is the major contributing factor to persistent food shortages in southern Africa, arising from the interaction among four effects: labour shortage, asset and skill loss, the increasing burden of care for the sick and orphans, and malnutrition (de Waal and Whiteside 2003). The hypothesis claims that the available farm labour is likely to be directed towards less labour-intensive root crops, such as sweet potatoes and cassava, further compromising nutritional values. The hypothesis was illustrated by the examples of Malawi and Zambia, to substantiate the claim that the progressive increase in cassava production was an indication of a structural downward shift in impoverishment (ibid.). This hypothesis is further examined in this thesis.

Integrated Pest Management and Farmer Field Schools

Crop protection in smallholder farming by means of Integrated Pest Management (IPM) and Farmer Field Schools (FFS) was elaborated as a response to over-dependence on synthetic pesticides in irrigated rice in Indonesia (Bruin and Meerman 2001; CIP-UPWARD 2003). IPM/FFSs were originally developed as a concept to rethink

the 'engineering' solutions to pest control that had been widely adopted in so-called Green Revolution approaches, which were inducing pest outbreaks in rice agro-ecosystems (Pontius, Dilts et al. 2000). Bajwa and Kogan (2002) collected and consolidated 67 versions of the definition of IPM that had been published between 1959 and 2002. They then summarised the concept of IPM as follows:

> IPM is a broad ecological approach to pest management utilizing a variety of pest control techniques targeting the entire pest complex of a crop ecosystem. Integrated management of pests ensures high quality agricultural production in a sustainable, environmentally safe and economically sound manner.

FFSs were first developed for small-scale rice farmers in Indonesia in 1989 (CIP-UPWARD 2003). Emerging largely from well-tested models of rural primary healthcare and functional literacy, FFS is a form of adult, non-formal education. The basic concept is that farmers learn through field observation and experimentation (Williamson 1998; Callens and Gallagher 2003; van den Berg 2004). Groups of farmers meet in regular sessions throughout the crop season till harvest to observe, measure, test, analyse, and discuss the crop's ecosystem dynamics. Their understanding of the functional relationships in ecological processes is improved by carrying out formal on-farm experiments (van den Berg 2004).

IPM/FFSs have shown success in parts of sub-Saharan Africa (Braun, Jiggins et al. 2006) but, since the introduction of FFS in Malawi in the late 1990s, IPM/FFSs have had a questionable history and limited impact (Orr 2003). The contribution and potential of IPM/FFSs are further assessed in this thesis.

Conceptual framework

The complexity of food production deficits and the livelihood security of farmers cannot be reduced to single-factor biophysical and technological issues and explanations. The socio-economic dimensions of specific livelihoods, as well as institutional and policy issues, need to be included.

The conceptual development of this thesis was stimulated by the 'New Variant Famine' hypothesis. On the basis of my previous experience in Malawi, I considered that this hypothesis might underestimate the capability of farmers in deciding how to cope with the challenges of poverty. The questions that then arise are: How do farmers perceive

their livelihood opportunities and do they devise strategies for coping with increased risks? Is it possible to offer a more nuanced interpretation of the 'New Variant Famine' hypothesis by considering the perceptions of those most affected?

This thesis, therefore, is associated with the concept of *agency*, that is, the idea that each individual is an agent in his or her own life journey and the various and varying relationships that are formed with others and with the material and living world around them (Harré 1981: 16):

> If one adopts as a general theory of action, that people are agents acting intentionally in accordance with socially grounded rules and conventions to realize projects, then the entities in need of empirical investigation are clearly defined. We would need to know about intentions and their modes of realization relative to more or less over-arching personal projects.

The literature and my own previous work in Malawi indicated that three key conceptual 'domains of research' for structuring the study would be the dynamics of cassava management, livelihoods, and HIV/AIDS. An over-arching concern related to these domains is the existing and potential policy responses.

Because the study reported in this thesis is based on a general theory of action 'that people are agents acting intentionally in accordance with socially grounded rules and conventions to realise projects' (Harré 1981), and that what we need to know about is their 'intentions and their modes of realization relative to more or less over-arching personal projects' (ibid.: 16), the research activity is biased toward *investigating people's perceptions in the context of the specific ways they seek their livelihoods in an impoverished, heavily AIDS impacted cassava-growing area, and how and why they act as they do*. This choice in turn has biased the research methodology toward ethnographic and participative inquiries, although positivist-empiricist methods were employed wherever it was useful to do so.

An important implication is that respondents' experiential knowledge comes to the forefront, thus taking research precedence over practical knowledge and over propositional knowledge based on testing hypotheses while not excluding either of these types of knowledge. In turn, this implies that the researcher's attention is

directed toward mapping the phenomena considered important, relevant, and salient by the respondents, as revealed in language and actions.

Problem statement, research objectives, main research questions

The problem statement therefore is as follows: How and why do the smallholder farmers in northern Malawi act as they do in the face of production, social and livelihood risks, which they can only partially control?

The specific objective of this study is to address farmers' perceptions of pest and disease management of cassava and how AIDS impacts crop production and livelihood opportunities in the Chilumba area, located in Karonga District, northern Malawi, where IPM/FFS efforts have been concentrated since their introduction to Malawi.

The main research questions addressed in this thesis are as follows:

- How do the local farmers perceive the production constraints of cassava in terms of plant protection, insect pests and diseases, and management strategies? (Chapter 2)
- How can the AIDS impact be estimated on household level indicators, focusing on family trees, crop patterns, and the food security of respondents? What is AIDS' role in relation to the 'threshold of social immunity'? (Chapter 3)
- How are individual mobility and livelihood systems impacted by AIDS? What are the roles of AIDS in the web of opportunity and stress experienced by households and individuals? (Chapter 4)
- What are peoples' responses to AIDS impact based on estimated impact levels and livelihood systems? How can the changes in perceptions of AIDS-related issues be interpreted in the light of the 'New Variant Famine' hypothesis and the 'threshold of social immunity'? (Chapter 5)
- How did the IPM/FFS movement develop in Malawi and what are the potential contributions of IPM/FFS to policies regarding subsistence crops and agricultural education in southern Africa? (Chapter 6)

The overall design of the study is sketched in the following diagram (Figure 1-4).

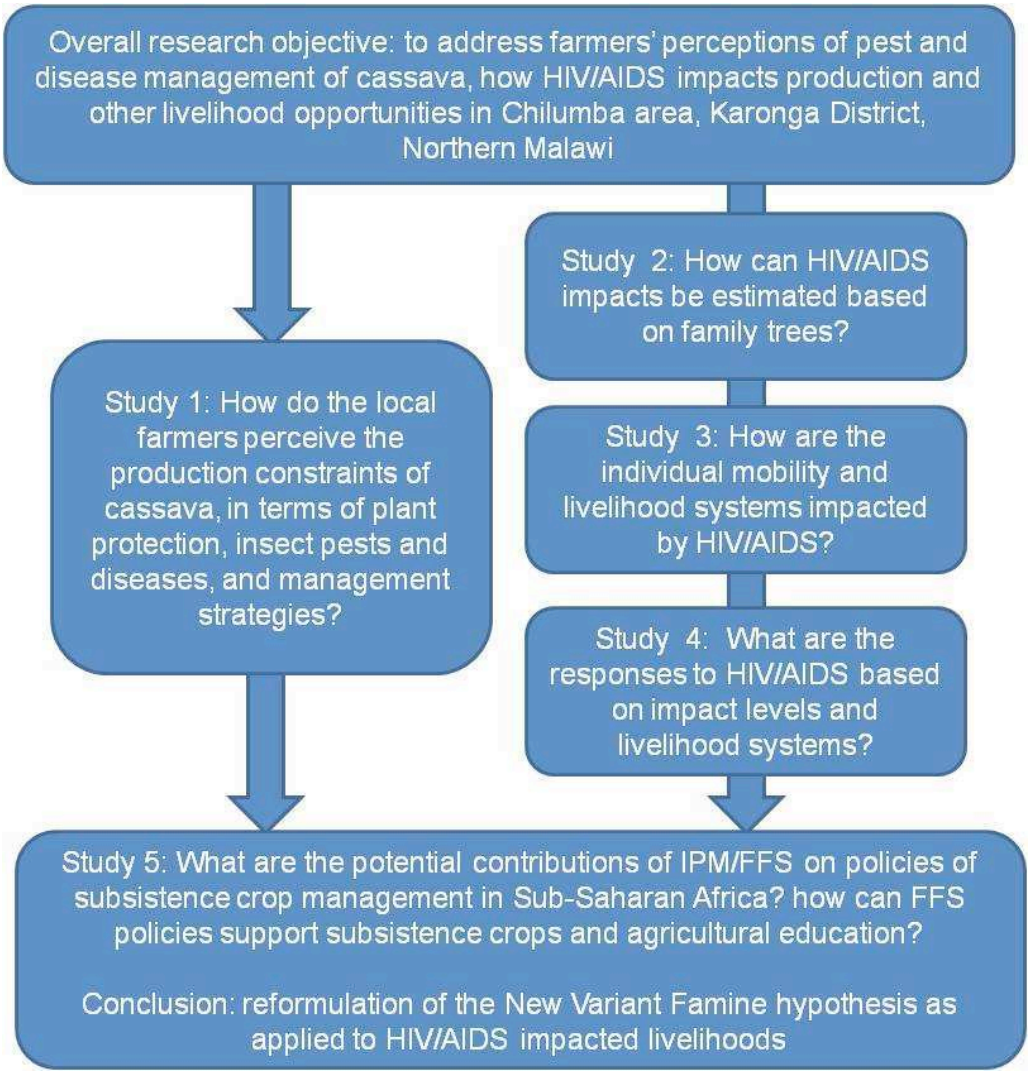

Figure 1-4 Overall design of the study

Research methodologies

Study area

Karonga District is located in northern Malawi. The typical, local staple food is cassava. Three farmer groups were identified in three locations in the Chilumba area in the southern part of Karonga District (Figure 1-5). One group had participated in FFSs on cassava and maize in upland areas (FFS-cassava); the second group had graduated from FFSs on rice and maize in Hara Rice Irrigation Scheme (FFS-rice), and the third group had never participated in any FFS (non-FFS). An overview of the geographic locations of each group follows.

Figure 1-5 Map of study area
Source: Microsoft 2009; Harris Corp, Earthstar Geographics LLC; National Geographic Society 2009.
Note: the area in black is the Lake Malawi

- Mwandovi village: FFS-cassava

Located on Luromo peninsula, Mwandovi village is close to the shore of Lake Malawi and Chilumba Jetty where there is a small market, a few local shops, restaurants and rest houses. Almost all male inhabitants in the village are, to some extent, engaged in fishing, typically using fishing nets and dugout canoes. Each household is allocated a piece of land to cultivate cassava for their home consumption. Maize is not favoured due to the alleged attack by animal pests (baboons in particular). Agricultural crops are generally not considered as a major source of cash income and are grown for home consumption. One FFS on cassava and maize started in 2007 and was ongoing as of 2008. In this village, it is common for young men to spend some years working in neighbouring countries (South Africa, Tanzania, Zambia, and Zimbabwe) as migrant workers. The peninsula is picturesque and, in 2007, a South African company began to enact plans to exploit a nearby island at the tip of the peninsula for tourism.

- Hara Irrigation Scheme: FFS-rice

With a total area of 238 hectares, Hara Irrigation Scheme covers three villages. The largest is Bonje village. Almost all households have been allocated one or more 'plots' (0.07 hectare each) in the Scheme to grow rice twice a year for cash income. In the dry season, the irrigated area is reduced to 227 hectares due to water shortages. Many households grow maize, cassava and other crops for home consumption in separate locations outside the Scheme. Some farmers keep livestock for ploughing. Regular sessions of FFSs on rice combined with maize have been taking place twice a year since 2003. Hara Irrigation Scheme is inhabited by a diverse mix of ethnic groups from different parts of Malawi and numerous Tanzanian migrant workers who are engaged in various trading (typically exporting rice) and service businesses.

- Kachere village: Non-FFS (control)

Kachere village is about 4 kilometres from the town of Uliwa, a major trading centre in Chilumba. Characteristically, some of the younger men operate bicycle taxi businesses, locally called 'cargo', stationed and registered at Uliwa. Although some households have access to the Hara Irrigation Scheme and fishing in Lake Malawi, almost all inhabitants are subsistence farmers, mainly growing cassava and maize for their own consumption. The people keep various types of livestock, such as cows, goats, pigs and poultry. As of October 2008, there had been no FFS initiative in this village.

Data collection and analysis methods

Field work was conducted from July 2005 to October 2008 in Malawi.

Data collection: For the collection of primary data on production constraints, crop protection strategies, and agronomic practices, the main techniques used were: participatory research methods (Mikkelsen 1995), including semi-structured interview techniques (mapping method; Chapter 2) and group interviews (*Bawo* exercise; Chapter 2); field sampling (Chapter 2); and participant observation (Chapters 2 & 6). In-depth interviews were conducted to capture the life history data (Deshpande 2005) (Chapters 3-5).

Sampling: For the studies that included FFS participants, the samples were selected randomly from a list of graduates provided by the local extension staff. For the studies

that included non-FFS participants, the farmers were selected randomly from a list of households provided by the village headman.

The research team: The research team comprised local research assistants with experience in conducting participatory social research. The interviews with farmers were mainly carried out in the local language (*ChiTumbuka*) with occasional use of English. Field sampling of cassava pests and disease was conducted under the guidance of technicians from national and local agricultural research stations.

Supplementary information: Secondary data were collected by key informant interviews of local leaders, research, and extension staff, as well as officers at the Ministry of Agriculture and other stakeholders in non-governmental organisations (NGOs) and donor agencies. For the data on IPM/FFS (Chapter 6), I also used information gathered from inventory surveys, key informant interviews and participant observation, and the proceedings and materials presented at the two national FFS workshops convened in Malawi in 2007.

Analysis: The semi-structured interview data on plant protection and agronomy were analysed quantitatively using statistical software SPSS (version 16.0, SPSS 2007), Excel (Microsoft 2007), and Anthropac (version 4.983, Analytic Technologies 1992). The in-depth interview data were analysed by genealogical software (Legacy, version 7.0, Millenia 2008) and qualitative analysis software (Atlas.Ti, version 5.0, Scientific Software Development 2004). The materials presented at the two national FFS workshops were analysed by means of content analysis (Patton 1980); discourse analysis (van Dijk 1985) was used selectively to analyse some of the key informant interviews.

Outline of the thesis

In order to address the issues discussed in this chapter, the thesis was structured as follows (Table 1-1).

Table 1-1 Titles and associated chapters

Titles	Chapters
Farmers' perceptions and knowledge of cassava pests and diseases in northern Malawi	2
Family trees and coping strategy analysis of AIDS-affected households in rice- and cassava-based farming systems in northern Malawi	3
Mobility mapping of AIDS-affected individuals in rice- and cassava-based farming systems in northern Malawi	4
Life history analysis of AIDS-affected households in rice- and cassava-based farming communities in northern Malawi	5
Farmer Field Schools in Malawi: lessons learned for improving livelihoods for small-scale farmers in Africa	6
General discussion and conclusions	7

The first part of the thesis (Chapter 2) looks at the production constraints perceived by subsistence cassava farmers and their management strategies for dealing with these. The second part (Chapters 3-5) investigates the livelihoods of the farmers by means of in-depth life history interviews and analysis. The third part (Chapter 6) discusses the science and policy issues that arise in the evolution and local adaptation of IPM/FFSs in collaboration with local stakeholders in Malawi and considers the relevance of an IPM/FFS approach to subsistence crops in Africa. The last part of the thesis (Chapter 7) consolidates the process experienced in the previous chapters and preceding exploratory work in Malawi and discusses how these findings may provide lessons for the wider context.

2 Farmers' perceptions and knowledge of cassava pests and diseases in northern Malawi

Midori Yajima, Janice. L.S. Jiggins, Arnold van Huis[3]

Abstract

A survey assessed farmers' perceptions related to the cultivation of cassava, focusing on pests and diseases in the Chilumba area, located in Karonga District, northern Malawi. A combination of participatory research methods was used involving 52 farmers in two cassava-based villages; 19 had participated in FFSs and 33 were non-participants. Cassava Mealybug (CMB), African Cassava Mosaic Disease (ACMD), and Elegant grasshoppers were the most widely perceived production constraints. Although most farmers recognised the visible insect pests and diseases, most of them did not consider the damage serious enough to take action. The farmers had limited understanding of natural enemies and vectors. Successful biological control programmes on CMB and Cassava Green Mite (CGM) were implemented without farmers' involvement, although CMB was still perceived by our respondents as a greatest threat. Over half of the farmers used improved varieties with higher tolerance against pests and diseases. However, cultural controls, such as roguing are hardly used mainly because controlling pests and diseases such as ACMD is not considered a priority. The farmers' participation in FFS sessions enhanced access to improved varieties, but did not have a major impact on their perceptions and control practices. A critical issue for FFSs is the design of the appropriate curricula on plant protection measures that farmers are able to take.

Keywords: cassava, pests, diseases, perceptions, Farmer Field Schools, Malawi

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[3] Submitted in February 2009

Introduction

This chapter begins by briefly summarising explanations for the surge in cassava production in Malawi since 1990 and the status on the control of pests and diseases of cassava in Africa from the mid-1980s. It then focuses on cassava grown by subsistence smallholder farmers using minimal inputs in Chilumba, located in Karonga District, in northern Malawi. The main purpose is to explore farmers' perceptions of the impact, control, and management of cassava pests and diseases. The findings form the basis for discussion of the actual and potential role of Farmer Field Schools (FFSs) in helping resource-poor farmers to manage cassava and their pests and diseases to meet their own food security needs in the context of AIDS impacts and contribute to meet the growing market demand.

Cassava production in Malawi

Cassava (*Manihot esculenta* Crantz) is an important food security crop in many parts of Africa (Minde, Ewell et al. 1999). Africa accounts for 49% of the world's total cassava production, with an estimated harvested area of 12 million hectares in 2007 (FAOSTAT 2009). Cassava tolerates dry environments and erratic rainfall. Cassava is grown in most parts of Malawi and it is a staple crop for 25-30% of the population (Kapeya, Nyirenda et al. 2002) in five districts: Karonga, Rumphi, Nkhata Bay, Nkhotakota and Salima, along the lakeshore area where soil fertility is relatively low (Moyo, Benesi et al. 1998; Mkumbira 2007). Between 1987 and 2007, cassava production in Malawi increased from 170 thousand to over 3 million metric tons (FAOSTAT 2009), with fresh roots accounting for the largest part of the surge (Phiri, Tembo et al. 2001). This growth has been explained by the deployment of improved varieties, which started with mass selection trials of existing clones and improved hybrids in 1992, followed by the release of 'improved local' varieties from 1995 onwards and new hybrids from 1999 onwards (Mahungu 1999). The erratic rainfall patterns in recent years and cassava's greater resilience to drought than maize, and the possibility to grow cassava as a cash crop, might also have encouraged farmers to grow cassava instead of maize. Another reason was the frequent changes in input subsidy policies which increased the relative cost of inorganic fertilizers used in maize cultivation (Ellis et al. 2003; Harrigan 2003; Minde et al. 1999; Mukherjee and Benson 2003; Orr and Mwale 2001). Although the availability of maize improved, owing to a revived fertiliser subsidy voucher system to smallholder producers which coincided with favourable rainfall during the planting seasons in 2005/06 and 2006/07, the demand for fresh cassava has persisted. Policy

errors that increased hunger even during good harvest years (Stevens, Devereux et al. 2002) led, among other effects, to an increase in poverty that stimulated demand for sweet cassava as a snack food. The impact of the AIDS also has been identified as causing labour constraints that stimulate a shift into the less labour intensive cassava crop among producers and increased demand by consumers (Hillocks 2002a; de Waal and Whiteside 2003; Haggblade and Zulu 2003).

Pest and disease management of cassava

Cassava yields per hectare in Africa are generally low and this is attributed to water shortages due to irregular rainfall, poor soil fertility, limited use of inputs, and pests and diseases (Bellotti, Smith et al. 1999). Common generalist pests of cassava in Africa are: Variegated grasshopper *Zonocerus variegatus* (Orthoptera: Pyrgomorphidae) in West Africa, Elegant grasshopper *Zonocerus elegans* in Southern Africa, and the whitefly *Bemisia tabaci*. Major specialist pests include two that were accidentally introduced from South America: Cassava Mealybug (CMB) *Phenacoccus manihotti* (Homoptera: Pseudococcidae) into Congo and Zaire in 1973 and Cassava Green Mite (CGM) *Mononychellus* (Acari: Tetranychidae) into Uganda in 1971 (Bellotti, Smith et al. 1999). The yield losses due to CMB is recorded to be up to 84% (Nwanze 1982) and CGM up to 60% (Herren and Neuenschwander 1991). African Cassava Mosaic Disease (ACMD) is a serious virus disease of cassava in many African countries, transmitted by the whitefly vector and unintentionally spread mainly by infected cuttings (Hillocks 1997). Overall yield loss by ACMD in Africa was estimated at 30-40% in the diseased plants (Thresh, Otim-Nape et al. 1997; Calvert and Thresh 2002). In 1997/8, a survey of 41 sites in the central lakeshore region of Malawi indicated a 42% incidence of ACMD (Theu et al., unpublished, cited in Thresh and Cooter 2005). Other common diseases include Cassava Brown Streak Disease (CBSD) (also transmitted by whitefly vectors), Cassava Bacterial Blight (CBB), Cassava Leaf Spot (CLS), Anthracnose, and Tuber Rot. The occasional pests include termites (Isoptera), thrips (Thysanoptera), and cassava scales *Aonidomytilus albus* (Hemiptera: Diaspididae) (IITA 1990; Bellotti 2002; Kapeya, Nyirenda et al. 2002; Maruthi, Hillocks et al. 2005).

Chemical control

Cassava in Africa is grown primarily on a small scale with minimum purchased inputs (Bellotti, Smith et al. 1999; Bellotti 2002). Pesticides are rarely used against insect pests and vectors of cassava diseases due to the relatively low priority given to the

crop and the mixed cropping system (Bellotti 2002; Thresh and Cooter 2005). Pesticides are rarely used on subsistence food crops because of high costs, lack of application equipment, scarce labour shortage, and the unavailability of pesticides. Adopting chemical control approaches are often not a practical option for most subsistence cassava farmers in Sub-Saharan Africa. In the case of African Cassava Mosaic Virus (ACMV), it is not effective to control viruliferous whiteflies by applying insecticides because the virus spreads into the crop rather than between crops and it is difficult to kill the whiteflies before inoculation takes place (Calvert and Thresh 2002; Thresh and Cooter 2005). Experiences with other crops, such as cotton, indicated that insecticides are more likely to kill natural enemies than whiteflies (Eveleens 1983; Dittrich, Hassan et al. 1985).

Varietal control

The International Institute of Tropical Agriculture (IITA) provides improved cultivars resistant to CMB and CBB as virus-indexed plantlets, developed clones with high resistance to CGM and to other pests and diseases, and released more than three varieties in each of the cassava-producing countries in Africa (Hillocks 2002a). In Malawi, 67 multiplication nurseries were established between 1998 and 2002 for improved cassava cultivars (Kapeya, Nyirenda et al. 2002). Despite efforts to establish germplasm banks, farmers' choice of cultivar is often limited to local landraces, because of preferences for particular cultivars (Hillocks 2002a; Kapeya, Nyirenda et al. 2002). Studies have shown that the majority of cassava varieties, 60% of which is grown in Nigeria and 86% in Tanzania, are 'sweet' ones with lower cyanogenic potential and are eaten in fresh raw form without preparation by heat (Nweke and Bokanga 1994; Oluwale, Onabolu et al. 2007). However, some local farmers may prefer 'bitter' cultivars with high cyanogenic potential (fresh root parenchymal tissue concentration of>100mg kg-1 HCN) because high cyanogenic glucoside concentration is considered to be a defence mechanism against pathogens and arthropod and mammalian pests (Bellotti and Riss 1994) as well as to prevent thefts (Chiwona-Karltun 2001). Interview surveys in Malawi demonstrate that farmers' classifications of cassava types match characterization by molecular markers (Mkumbira, Chiwona-Karltun et al. 2003). Attempts to introduce high yielding, resistant varieties need to consider local preferences as selection criteria through farmer participation in germplasm evaluation (Bellotti, Smith et al. 1999).

Cultural control

The management of field size and shape, planting date, spacing, intercropping, roguing, soil fertility, and varietal choice influence insect pest populations and the spread of vector-borne diseases (Thresh 1982). In the 1980s, a systematic removal of existing cassava plants followed by replacement by disease-free and tolerant cuttings took place in some parts of Malawi, and it was reported that the ACMD infection was almost entirely removed from the northern region (Thresh and Cooter 2005). These efforts require the participation and cooperation of various stakeholders at different levels, particularly farmers. The success of controlling the disease depends on farmers' disease recognition and their perception of damage so that they can select their own planting materials, plant early, and maintain the health of their crop by roguing. Although this has been advocated in Kenya for a long time, it has not been widely practised because farmers are reluctant to rogue plants unless they perceive the disease impact to be a serious problem (Hillocks 1997).

Biological control

In 1985, cassava in the northern lakeshore region in Malawi experienced devastation due to CMB, particularly in the Nkhata Bay district (Pelletier and Msukwa 1990; Neuenschwander, Borowka et al. 1991). In 1985, the parasitoid wasp *Apoanagyrus lopezi* (Hymenoptera: Encyrtidae) was introduced as a biological control agent for CMB in Africa (Herren and Neuenschwander 1991; Yaninek, Onzo et al. 1993). It has been established in 26 African countries, including Malawi (Neuenschwander 2001; Zeddies, Schaab et al. 2001). It is known as a successful example of classical biological control, and the follow-up surveys concluded that the pest population has since been contained (Neuenschwander 2001; Neuenschwander 2004). When the external support phased out, the Malawi government took over the responsibility for continuing this effort (Mwanyongo, Maulana et al. 2003). Nevertheless, persisting damage by CMB has been reported from various parts of Africa, including Malawi (Neuenschwander, Hammond et al. 1990).[4] A survey in two ecological zones in Nigeria and Benin found that agronomic practices, such as mulching on sandy soils, combined with crop rotation were important to ensure the effectiveness of biological control by

[4] Nyirenda, G.K.C., interview by author. 07/10/2008, Lilongwe.

the *A. lopezi* (Herren and Neuenschwander 1991; Neuenschwander et al., 1990). This might explain why the problem of CMB has persisted in Malawi.

The Brazilian species of phytoseiid *Typhlodromalus aripo* (Acari: Phytoseiidae) was released between 1984 and 2000 to control CGM (Yaninek and Herren 1988; Yaninek et al., 1998) and has been successfully established in 20 African countries, including Malawi (Ariori and Dara 2007; Gnanvossou et al. 2002; Onzo et al. 2005; Yaninek and Hanna 2003). The CGM population has been clearly shown to be suppressed after introducing *T. aripo* (Onzo, Hanna et al. 2003) but the actual impact on cassava yield in Malawi is not understood in detail.[5]

Agricultural extension challenges, Farmer Field Schools in Malawi

Extension services could play an important role in reducing the impact of pests and diseases, for example by promoting cultural control and plant sanitation through the roguing of infected plants and the use of virus-free planting materials.

However, staff shortages pose serious constraints to agricultural extension in Malawi. One survey (Snapp 2004) showed that only 5% of smallholder farmers in the Southern and Central Regions of Malawi have ever been reached by extension messages. The shortfall is attributed to retirement, transfer, and deaths of staff members without replacements as well as their withdrawal from government posts due to poor working conditions. In recent years, staffing of government services in southern Africa has been severely affected by the AIDS epidemic, thereby further depleting the capacity of agricultural extension to contribute to smallholder crop development.

Farmer Field Schools (FFSs) were originally designed to help farmers apply integrated pest management (IPM) practices to their agro-ecological conditions (van den Berg 2004). However, it has been argued that IPM/FFSs have shown limited success in Malawi (Orr and Ritchie 2004; Kamwela and Sande 2007).

The Chilumba area was selected because, since the ToT in 2003, 38 out of the total of 84 Farmer Field Schools (FFSs) in the country up to 2006 were conducted in this district,

[5] Nyirenda, G.K.C., interview by author. 07/10/2008, Lilongwe.

mainly based on rice in an irrigation scheme, but also on cassava and maize in the upland areas (Ministry of Agriculture and Food Security 2006). Within the Hara Rice Irrigation Scheme, 120 farmers had graduated from four FFSs on rice as of 2007, while 21 farmers had participated in FFSs on cassava (Kamwendo 2007).[6]

Farmers' perception and objectives

As discussed earlier, crop protection measures such as varietal and cultural control require farmers' involvement in managing overall crop pests and diseases. Farmers' perception of crop health is therefore particularly important, which merits greater emphasis (Bentley and Thiele 1999). In improving farmers' involvement in strengthening IPM/FFSs, an understanding of main operators of tasks around crop production and protection as well as farmers' perceptions on injury and control measures need to be considered in designing the curriculum and selecting the target group.

The objectives of this study were to understand local farmers' knowledge regarding cassava plant protection, focusing on insect pests and diseases, and management strategies in the Chilumba area. The relevance of the farmers' knowledge is discussed in the light of scientific evidence, field observations, and the literature. We also assessed whether the exposure to a cassava-based FFSs has had an impact on the crop protection knowledge and practices of the farmers in order to suggest possibilities for strengthening cassava-based FFSs in the future.

Materials and methods

Site selection and sampling strategy

In Chilumba, we worked in two villages: Mwandovi, where FFSs based on cassava and maize have been concluded (FFS-cassava), and Kachere, where farmers never participated in FFS activities (non-FFS). The main staples are cassava supplemented by maize, both of which can also be traded. Some farmers in both villages had access to plots in Hara Irrigation Scheme to grow rice for cash income, while the respondents in FFS-cassava typically engaged in fishing in the Lake Malawi as well as processing and trading of fish and seasonal lakefly cakes. A total of 52 farmers were randomly selected

[6] Kamwendo, N.D., interview by author. 02/09/2008, Chilumba.

in the two villages: 19 who participated in FFSs (14 women, 5 men) and 33 non-participants (20 women, 13 men). Sampling for pests and diseases in cassava plants in the field was conducted in 20 farmers' fields close to these villages as well as one FFS plot to provide an indicative technical check against farmers' perceptions.

Data collection methods

Four methods were used in this study: (1) Bawo exercise (n=6); (2) mapping method (n=52); (3) survey for pests and diseases in cassava plants in selected fields (n=21) by field sampling; and (4) informal key informant interviews (farmer facilitators of FFSs, extension staff, research technicians: n=10) on FFS activities and curricula. The interviews were mainly carried out in the local language (*ChiTumbuka*), while English was used occasionally.

Bawo exercise

In a group-based participatory exercise, we used a locally available wooden game board called '*Bawo*' (Figure 2-1) as a research tool (n=6; 3 groups: one mixed group of FFS participants, one women's group of FFS graduates, and non-FFS women's group with x 2 replications). The '*Bawo*' exercise was facilitated by research assistants who had participatory research experience. The exercise comprised matrix weighting of annual rainfall (both quantity and distribution), crop production, and pest and disease prevalence for cassava during the past four years. Each column of four rows represented years. The columns of eight rows represented rainfall conditions, production, and severity of pests and disease. These variables were scored and weighted in the respective holes. Using a scale of 1 (little/ small) to 5 (very much/ large), weighting was represented by the number of seeds or stones (maximum of 5) placed in each cell, e.g., rainfall in year 2005. Thus, this method generated a correlation of four variables: perceived rainfall, crop production, and perceived pest and disease severity over the last four years. The weighting exercise further incited discussion and explanation of farmers' perceptions of the interactions between these variables.

Year
2007
2006
2005
2004

Variables	Rainfall	Cassava production	Cassava pests	Cassava diseases	Weeds	Maize production	Maize pests	Maize diseases

Figure 2-1 *Bawo* board
Source: Bawo exercise at Mwandovi FFS group, Chilumba, 17/09/2008

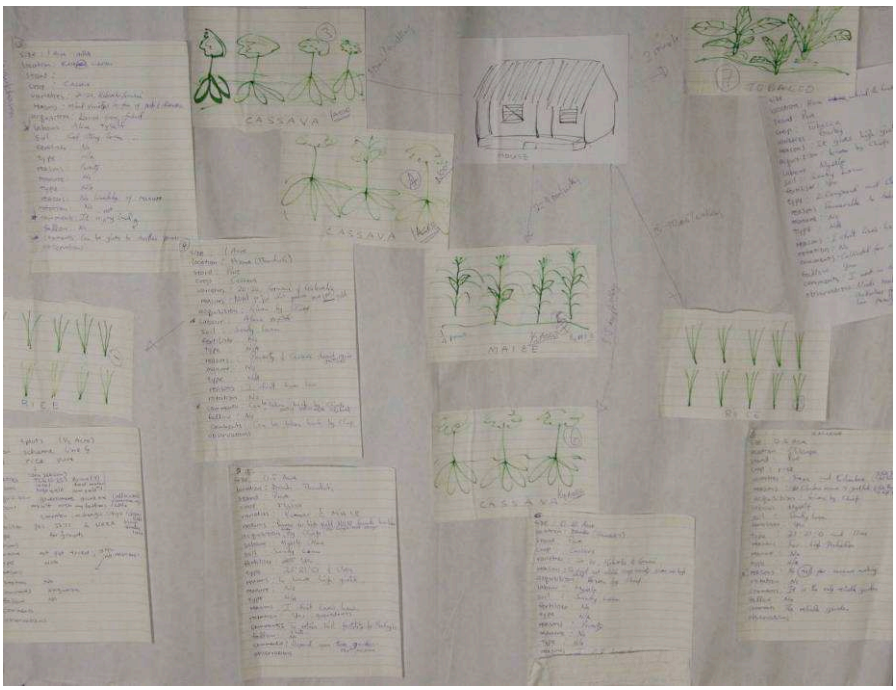

Figure 2-2 A map of a respondent in Kachere village
Source: mapping method, Chilumba, 19/09/2008.

The crop mapping method

The crop mapping method was devised to look at the status of the crop in farmers' homes and fields. It comprised semi-structured individual interviews (n=52; 34 women, 18 men) concerning cassava production constraints; labour allocation in cassava production; responsibilities of the household members (in terms of gender, generation, and relation to household head) and hired labourers; and details about the famers' fields, including the number and size of plots, distance from house, crop stand, and varietal selection and reasons, which was done on-site through the drawing of a map. This was followed by visits to cassava fields with farmers to gain an understanding of their perceptions of pests and diseases, in terms of symptoms, causes, losses and control methods, and planting stem management practices (walk and talk informal interviews).

Sampling for pests and diseases in cassava plants in the farmers' fields

In early October 2006, pest and disease incidence in 21 (20 farmers' fields and one trial field for FFS) selected fields was scored by sampling. Cassava plants were sampled using a modified version of the protocols adopted from an IITA guideline (IITA 1990). It was administered by entomologists based at the University of Malawi and by technicians of Baka, Chitedze, and Chitala agricultural research stations, and pre-tested in Salima District in September 2006. Seven plots in two villages, Mwandovi (FFS-cassava) and Kachere (non-FFS), were selected. In each of the 21 plots, the scouting was done by sampling ten plants in a diagonal line, leaving out the first and the last two rows in order to avoid border effects. The scoring was done on plant height; whitefly population (nymphs and adults); ACMD and CBSD; CGM and CMB populations; damage; parasitoids and predators; population of Elegant grasshopper; termites and cassava scales; and symptoms of CBB, Anthracnose, Tuber Rot, and any other observable diseases.

Data analysis

The results of *Bawo* exercise and the mapping method were analysed using Excel (Microsoft 2007) and SPSS (version 16.0, SPSS 2007). The scores elicited in *Bawo* exercises were analysed by SPSS using Spearman's correlation test between the variables and one-way independent ANOVA. Data gathered in the field sampling was summarised using Excel.

In order to understand the perception of pests and disease problems collected during the mapping method, freelisting (Gatewood 1984), a form of cultural domain analysis

(Borgatti 1999; Puri and Vogl 2004), was conducted using Anthropac software version 4.983 (Analytic Technologies 1992) to look at the frequency and salience of local knowledge (Price and Gurung 2006). Freelisting is used to elicit and rank local meaning and relevance of perceptions as cultural domains based on the free naming of all the items the respondent can think of in the 'domain', i.e., 'problems in growing a cassava crop'. The proportion of respondents who mention the item and the order of the items mentioned are used to interpret salience in the group (Borgatti 1999). These variables are combined as Smith's salience: a frequency count weighted inversely by the rank of the item in each list (Smith and Borgatti 1997).

Data from the field sampling and information gathered during key informant interviews were used to supplement the data collected in the mapping method and *Bawo* exercise.

Results

Farmers' socio-economic profile

The 52 cassava farmers comprised 34 women and 18 men. The age varied from 19 to 78 years, with an average of 47 years old. Nineteen farmers (37%) had participated in an FFS (5 farmers=10% graduated; 14 farmers=27% attending on-going sessions at the time of interview) while 33 (63%) had never attended FFSs. Nineteen farmers (37%) did not complete primary schools, 15 (29%) finished primary schools, nine (17%) did not complete secondary schools, four (8%) finished secondary schools, three (6%) have never attended formal education, one (2%) was still at secondary school, and education data was missing for one (2%). Twenty-four farmers (46%) were in monogamous marriages, 14 (27%) in polygamous marriages (either married to more than two wives or to polygamous husbands), while seven (13%) were widowed, five (10%) were divorced and two (4%) were single.

Crop allocation by area

Landholding size ranged between 0.2 and 3.9 hectares, with an average of 1.3 hectares. For all farmers combined, the area intercropped with cassava and maize was the largest, with a total of 25.6 hectares, followed by the area planted to cassava (23.9 hectares), rice (7.7 hectares), maize (7 hectares), and tobacco (0.3 hectares). A total of 2.2 hectares was planted to other crops such as sweet potatoes, groundnuts and sorghum (Figure 2-3).

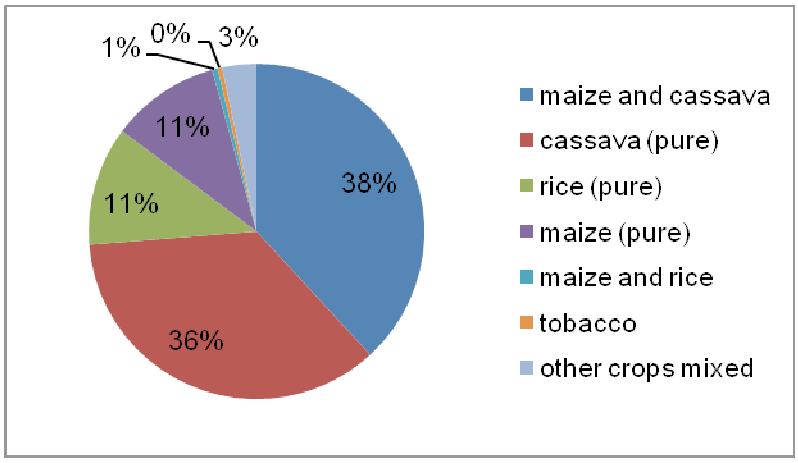

Figure 2-3 Crop stand and allocation by total area
Source: semi-structured interviews by mapping method, Chilumba, 09/2008

Bawo exercise

It was observed that there is a significant positive correlation between rainfall against perceived production (Spearman's rho=0.02) and a significant negative correlation between rainfall against perceived pest (rho=0.013) and disease (rho=0.014) prevalence. The result of one-way independent ANOVA indicated no significant impact ($p \leq 0.05$) between groups and years. This suggests that participation in FFS did not have a major effect and there was not much variation in terms of pests and disease prevalence over the past four years. For the rest of the analysis, the data for FFS and non-FFS farmers are merged unless indicated separately.

Main operators for cassava production

In order to look at the division of labour involved in cassava production, in terms of gender, generations, and the role of children and non-family members, we asked the farmers to mention who was in charge of tasks involved in each stage of cassava cropping (Figure 2-4).

When asked about the hardest task (requiring most effort), land preparation (ridging) was mentioned by 65% of the farmers (scored highest in frequency and ranking). This was followed by land clearing (16%) and harvesting (8%). The most time-consuming task was perceived to be ridging and weeding (both mentioned by 35% of the farmers), followed by processing (22%). Land clearing and preparation was primarily done by adult male (husbands and hired labourers), whereas the rest of the process mainly

involved wives and children/grandchildren. Ridging, processing, and first weeding were mostly done by women. It was recognised that nearly 20% of the interviewed farmers did not take any control measures against pests and diseases of the cassava crop.

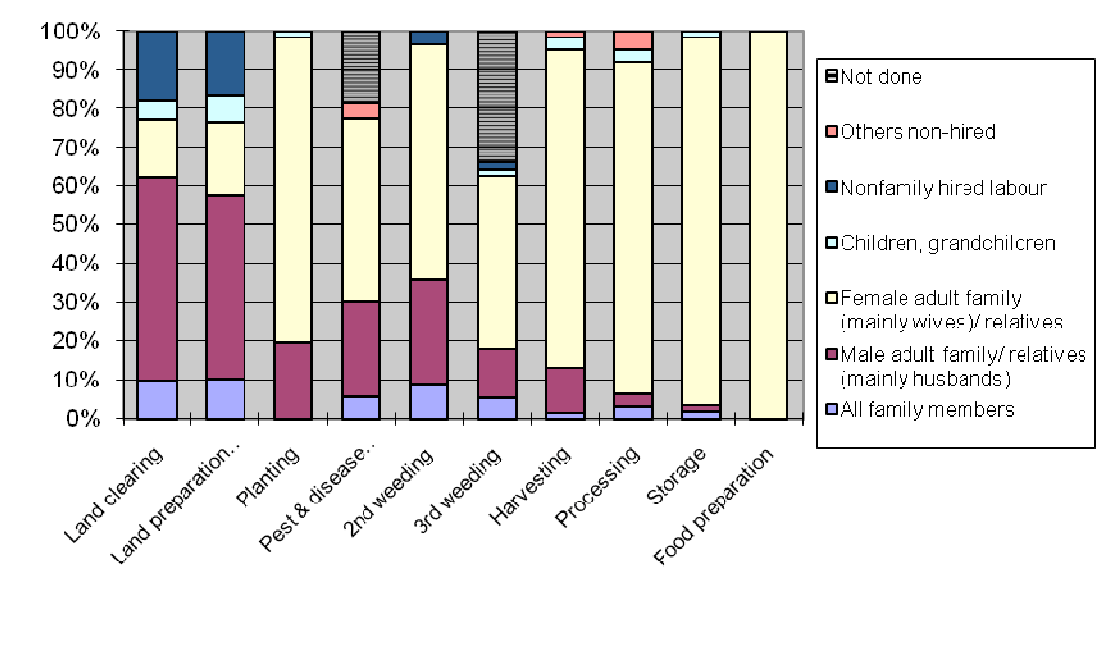

Figure 2-4 Main operators of cassava tasks
Source: semi-structured interviews by mapping method, Chilumba, 09/2008

Notes:
Male adult family: husband, male head, brothers, relatives, etc.
Female adult family: wife, female head, sisters, relatives, etc.
Children/ grandchildren: up to 14 years old
Non-family casual hired labourers: *ganyu* and *kukomalizya*
Other non-family members: extension workers, friends, neighbours, well wishers, etc.
Not done: task not conducted by anybody
Ganyu: casual hired labour or piecework rewarded by provision of money or in-kind
Kukomalizya: food-for-work. Organised by inviting neighbours and friends to assist short-term work in the field, with provision of meals as a token of recompense

Field sampling and farmers' perceptions of production constraints of the cassava crop

The pests and diseases encountered during the sampling on selected farmers' fields are presented in Table 2-1.

Table 2-1 Pests and diseases encountered in farmers' cassava fields during sampling

Villages	Plant Height (cm)	CGM					CMB								
		Population	Damage score	Tip Score	Predators	*T. aripo*	Population	Damage score	Parasitised nymphs	*A. lopezi*	Predators (ants)	Predators (spiders)	Predators (Scymnus)	Predators (Exochomus)	Predators (lacebug, Tingidae)
Mwandovi (FFS-cassava)	84.7	3.3	1.1	1.6	0.0	0.0	4.3	1.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Kachere (non-FFS)	85.6	0.1	1.0	1.0	0.0	0.0	5.8	1.9	0.1	0.0	0.8	0.3	0.1	0.2	0.1
Total mean	**85.1**	**1.7**	**1.1**	**1.3**	**0.0**	**0.0**	**5.1**	**1.5**	**0.0**	**0.0**	**0.5**	**0.2**	**0.1**	**0.1**	**0.0**

Villages	Elegant grasshopper		Whitefly		Cassava scales	Micro/ macro termite	Other insect pests	Virus Score		CBB	Tuber rot	Fungal disease
	Population	Damage score	Population (adults)	Population (nymphs)				ACMD	CBSD			
Mwandovi (FFS-cassava)	0.0	1.0	0.1	1.6	1.1	1.0	0.0	1.3	1.6	1.0	1.0	1.0
Kachere (non-FFS)	0.0	1.0	0.1	0.8	1.0	1.0	0.0	1.3	2.2	1.0	1.0	1.0
Total mean	**0.0**	**1.0**	**0.1**	**1.2**	**1.0**	**1.0**	**0.0**	**1.3**	**1.9**	**1.0**	**1.0**	**1.0**

Notes:
- Scoring based on IITA guidelines (IITA 1990)
- Virus scores, tip scores, mealybug damage scores, Elegant grasshopper damage score, cassava scale, and termite: severity of damages are scored using a scale from 1 (no obvious symptoms) to 5 (complete damage)

The problems around cassava production elicited during the crop mapping method are summarised in Table 2-2. Because the multiple responses were recorded separately, the results of the freelisting indicated in percentages are not collectively exhaustive.

The whitefly population and moderate injury from ACMD infestation were confirmed during the field sampling. CBSD infection was observed, although no farmer indicated it as a problem. CGM population was recorded in the sampling, but only 10% of the respondents perceived it as a problem. No natural enemies for CGM, including *T. aripo,* were found. Populations of CMB and its (moderate) damage, and CMB's natural enemies (*A. lopezi* and predators) were sporadically observed. Although neither the Elegant grasshopper nor its damage was observed at the time of the sampling, some farmers mentioned that its population is dynamic. Cassava scale infestation was occasionally recorded. No termite attack, CBB, Tuber Rot, Fungal Disease, or rodent pests were observed during the survey.

The result of freelisting showed that the three major problems perceived by the farmers were CMB, ACMD, and Elegant grasshopper. We focused on these three pests and diseases in the following in-depth questions.

Table 2-2 Freelist: problems related to growing cassava cited by farmers

Ranking sorted by frequency	***All*** (n=52) (Frequency)	***FFS*** (n=19) (Frequency)	***Non-FFS*** (n=33) (Frequency)
1	Cassava mealybug 42 (81%)	Cassava mealybug 15 (79%)	Cassava mealybug 27 (82%)
2	African cassava mosaic disease (ACMD) 31 (60%)	African cassava mosaic disease (ACMD) 13 (68%)	African cassava mosaic disease (ACMD) 18 (55%)
3	Elegant grasshopper 18 (35%)	Elegant grasshopper 11 (58%)	Elegant grasshopper 7 (21%)
4-	Tuber rot 8 (15%) Cassava scale 8 (15%) Sun heat 6 (12%) Whitefly 6 (12%) Cassava Green Mite 5 (10%) Rodent pest 5 (10%) 'Oil' (honeydew from mealybug) 4 (8%)	Tuber rot 7 (37%) Cassava scale 6 (32%) 'Oil' (honeydew from mealybug) 4 (21%) Poor soil 3 (16%) Sun heat 3 (16%) Rodent pest 3 (16%)	Whitefly 5 (15%) Cassava Green Mite 4 (12%) Sun heat 3 (9%) Rodent pest 2 (6%) Labour demand 2 (6%)
Other	Labour demand Poor soil Weeds Monkeys Wild mushroom Shortage of planting stems Lack of market		

Source: Freelisting: Semi-structured interviews by mapping method, Chilumba/ 09-11/2007

Farmers' perceptions of symptoms, causation, and losses from major pests and diseases based on the mapping method

Cassava mealybug (CMB)

CMB is called *Ntchembere zandonda* in the local language *ChiTumbuka*, which is commonly understood in Chilumba. It literally means 'parous women in a queue'; possibly depicting the way CMB attacks the tips in large numbers. This term is also used for African armyworm *Spodoptera exempta* (Lepidoptera: Noctuidae) which attacks maize crops, especially in the Central Region of Malawi.

Identification by symptoms: 'what is happening to the plant?'

By pointing to a plant attacked by CMB, we asked the question 'what is happening to the plant?' to the respondents. Fifty-one percent of the total respondents identified the symptoms as caused by the specific name of the pest (either '*Ntchembere zandonda*' in the local language or 'Cassava Mealybug'). Some (6%) of the respondents mentioned '*vibungu*', meaning grub or caterpillar (Turner 1996: 12), a general term covering the notion of larvae of unspecified insects, while 8% mentioned '*matenda*' (meaning diseases). Ten percent did not know and 8% did not consider it as a problem. One FFS farmer said *tunyinda* (lice) and another non-FFS farmer said *kayuwili* (normally used for symptoms of ACMD). Some farmers (8%) provided an explanation that CMB is more problematic in the hot dry season (late October-November) when the temperature was higher.

Causation: 'why is this plant affected and not that one?'

Thirty-one percent of the respondents said they did not know where the problem came from and 19% said it was a coincidence. Thus, a total of 50% of the respondents did not know the source of the problem. The percentage of farmers who answered 'I don't know' was higher with non-FFS farmers (42%) than the FFS farmers (11%). Nineteen percent of the total said it is caused by crossing over by other plants. Six percent mentioned that the variety was susceptible while another 6% mentioned it came through the infested planting materials.

Consequences: 'how does it affect the crop?'

Forty percent of the total respondents noted the stunted growth of the crop due to the CMB infestation. Twenty-two percent mentioned the low yield, 16% suggested the

tubers rot, another 16% indicated the drying up of the stems (leading to a shortage of recyclable planting materials), and 4% mentioned bunchy top. While 84% recognised some extent of damage, the remaining 16% said no harm or yield loss resulted. Of the 10% of farmers who noted the honeydew (often referred to as 'oil') secreted from the mealybug-infested plants, 8% considered it harmful while 2% considered it to be beneficial to the soil.

Control measures: what do you do about this problem, or to avoid it?

Thirty-seven percent responded they do nothing against the CMB. Removal of the tips was mentioned by 10% though this is not recommended by the agricultural extension services. Roguing was mentioned by 10% and was practised only by 6%. Four percent suggested that they wait until the rain washes the pest away. One FFS-farmer mentioned application of *Tephrosia vogelii* extract (locally called *mtetezga*) and another non-FFS farmer mentioned careful selection of cuttings.

African Cassava Mosaic Disease (ACMD)

ACMD is called '*kayuwili*' in the local language, which is borrowed from the name of rice blast disease. The term needs to be treated with caution because it is sometimes used to mean CGM or cassava scales.

Identification by symptoms: 'what is happening to the plant?'

Looking at the plants showing symptoms of ACMD with curled leaves, 25% of the farmers identified it as 'disease infection' and, of those, 4% (2 FFS-farmers) mentioned the name 'mosaic' and 6% (3 non-FFS farmers) '*kayuwili*'. Thirty-one percent of the farmers said they did not know what was happening to the plant and 13% said nothing is happening, making a total of 44%. Ten percent linked ACMD infection to CMB infestation.

Causation (transmission route): 'why is this plant affected and not that one?'

Forty-four percent responded that they did not know how the disease came about, while 10% mentioned the infected stem cuttings, 8% said the variety was more susceptible compared to others, 6% related it to whitefly nymphs, 6% to the sun heat, and 2% (one FFS-farmer) attributed it to the wind. Another 2% (FFS-farmer) noted coccinellid, possibly Exochomus sp., specifically on mealybug-infested cassava plants.

Consequences: 'how does it affect the crop?'

Thirty-eight percent of the respondents recognised reduced yield as a result of ACMD infestation; some noted stunted growth (15%) of the plant while others mentioned rotten, small or spongy tubers (15%). When rotten tubers were mentioned, it was not clear whether the perceived loss of rotten tubers in these cases was attributable to ACMD or to other diseases. On the other hand, 29% mentioned that there was no damage. Twelve percent suggested processing quality (soaking in water) is compromised, resulting in poor quality of flour.

Control measures: 'what do you do about this problem, or to avoid it?'

Fifteen percent mentioned roguing, though practised by only 8% of them. Others mentioned changing varieties (2%) and stopping the recycling of cuttings (2%). Sixty-two percent of the respondents said that they do not know what to do against the disease, and 2% said that it is not a problem. Farmers who said nothing was happening (13%) were not asked this question.

Elegant grasshopper

Elegant grasshopper is locally called *Botawota* in *ChiTumbuka* language. In the Central Region of Malawi, it is called *M'nunkhadala* representing its foul odour. Because it was not present in the field during the survey, the subsequent questions were restricted to awareness, perceived potential damages, and control measures.

Awareness

Sixty-three percent of the farmers had knowledge of the Elegant grasshopper as an insect pest. Twelve percent have seen it elsewhere, 10% said that they have experienced problems in the past, and 8% mentioned that it would be prevalent in late October, just before the rainy season. Ten percent of the respondents had no knowledge of the insect.

Potential damages

The damage of Elegant grasshoppers were explained as feeding on cassava leaves (48%), cassava stems (29%), or the entire plant (12%), leading to the death of cassava (10%). Six percent said the pest mainly attacks maize. However, 12% of the respondents answered that they did not know the consequences of attack by Elegant grasshoppers.

Control measures when found

Twenty-seven percent answered that when they find the pest, they would kill it manually by hitting or smashing it physically either by hand or using some kind of tools (hoes, brooms, stones, and sticks such as tree branches). Seventeen percent said they would report it to the extension services. Of FFS-farmers, one mentioned application of *Tephrosia vogelii* and another one mentioned consideration of chemicals (although never tried), while yet another one mentioned that he would wait for the rain to start because that is also when the pest disappears. Seventeen percent said that they did not know and another 17% said that they do nothing.

Planting materials

Acquisition of planting materials

Ninety-six percent of the respondents used recycled cuttings either from their own field (96%) or from other farmers, described as relatives (including parents, in-laws; 14%), friends (including neighbours; 12%), and other farmers (6%). Fifteen percent of them obtained planting materials from extension services and 2% from a local NGO. Having access to the planting materials from extension services did not differ between FFS (16%) and non-FFS farmers (15%).

Criteria for healthy planting materials

The farmers' criteria for 'healthy cuttings' were as follows: 'fresh' (42%), 'plump' (35%), 'no disease symptoms' (29%), 'no white stuff' (23%), 'not withered' (17%), 'green' (8%), 'strong' (8%), 'fresh buds' (8%), and 'no bruises' (8%). Some also used their own criteria such as the originating plant should be less than one year old (1 non-FFS farmer) or to use 'wise' cuttings (1 non-FFS farmer, meaning improved varieties).

Measures to ensure health of planting materials

When cassava is harvested during the dry season, 58% of the farmers did not keep their own cuttings for the next planting season. During the rainy season, 56% planted shortly after harvest, or only replanted the ones harvested. Twenty-nine percent said that they keep stems near the water, which includes the lake, rivers, streams, swamps, and bathrooms. Twenty-seven percent said regular weeding helped keep stems healthy. Nineteen percent kept their cuttings under the shade, 15% suggested rouging, 6% suggested careful selection of stem cuttings, and 4% indicated use of improved varieties. On the other hand, 31% answered that they do nothing in particular to keep

them healthy and 6% used the excess cuttings as firewood. Four percent said that they did not know of any method of keeping the cuttings healthy.

Varietal selection and reasons

Twenty-five varieties were mentioned by the farmers (Table 2-3). Local varieties such as 20:20 (87%) and Koloweka (65%) were grown by the majority of farmers. Improved varieties such as Sauti (CH92/077) (38%), Silira (TMS 60142) (27%, locally called *matakulembwende*, meaning 'many buttocks'), and other unidentified improved varieties (6%, commonly called *boma*, meaning 'government') were also adopted. In fact, 58% of the total respondents were growing improved varieties along with other local varieties, and 14% had more than one improved variety. Of the FFS farmers, 74% were growing improved varieties, and of the non-FFS farmers 48%. On the other hand, non-FFS farmers grew a wider range of local cassava cultivars.

Concerning the reasons for selecting varieties, 67% of farmers chose to grow varieties because of the high yield and 14% chose varieties because of their 'sweetness'. However, 6% mentioned that they avoid sweet varieties because they are prone to theft. Twelve percent said the varieties produce good tubers which can be processed for flour and another 12% mentioned that cuttings for these varieties were easily available locally. Six percent of the total farmers said the varieties are resistant to pests and diseases, while 4% indicated fast maturity. Again, 5% of FFS farmers said that they chose local varieties because these are the only available ones, while 15% of non-FFS farmers gave the same reason.

Table 2-3 Freelist: Cassava varieties cited by farmers in Chilumba

Ranking sorted by frequency	***All*** (n=52) (Frequency)	***FFS*** (n=19) (Frequency)	***Non-FFS*** (n=33) (Frequency)
1	20:20 45 (87%)	Koloweka 14 (74%)	20:20 32 (97%)
2	Koloweka 34 (65%)	20:20 13 (68%)	Koloweka 20 (61%)
3	*Sauti* (CH92/077) * 20 (38%)	*Sauti* (CH92/077) * 10 (53%)	*Sauti* (CH92/077) * 10 (30%)
4-	*Matakulembwende/ Silira* (TMS 60142) * 14 (27%) Gomani* 11 (21%) Masoyazungu 8 (15%) Buyubuyu 6 (12%) Nyautonga 5 (10%) Thepula 4 (8%) *Boma* 3 (6%) Mbundumali* 3 (6%) Kajalajata Chitembwere* Mpapa Chiswanthema Dobi Chimphunobii Nyamalinda *Mkondezi* (Mk91/478) * Kanonono Nyakaphutu Beatrice Mshombe Tausi	*Matakulembwende/ Silira* (TMS 60142) * 7 (37%) Masoyazungu 4 (21%) Gomani* 2 (11%) Chitembwere * Nyautonga Mbundumali* Chiswanthema Buyubuyu *Boma* Nyamalinda *Mkondezi* (Mk91/478) * 1 (5%)	Gomani* 9 (27%) *Matakulembwende/ Silira* (TMS 60142) * 7 (21%) Buyubuyu 5 (15%) Thepula 4 (12%) Masoyazungu 4 (12%) Nyautonga 4 (12%) Mbundumali* Kajalajata Mpapa *Boma* 2 (6%) Chimphunobii Tausi Dobi Beatrice Mshombe Chitembwere* Kanonono Nyakaphutu 1 (3%)

Source: Freelisting: Semi-structured interviews by mapping method, Chilumba/ 09-11/2007

Notes:

- Improved varieties are italicised.
- *: recommended cultivars
- *Boma*: unspecified improved variety obtained from the government.
- Mbundumali (same variety as Manyokola) and Chitembwere are 'sweet' varieties, while the rest are considered 'bitter'
- Chitembwere, Gomani and Beatrice are local varieties but recommended by the government because of its pests and disease tolerance and favourable cooking quality.

Discussion: pests and disease management and FFS

In general, farmers recognised the visible pests and diseases as more problematic than the smaller, indeterminable ones, such as CGM. This was similar to the result of a survey in Cameroon (Poubom, Awah et al. 2005). Recognition of pests and diseases was lower than that observed in Ghana (Manu-Aduening, Lamboll et al. 2007). Negative climatic and environmental conditions, such as sun heat and poor soil fertility, were also considered as obstacles to a lesser degree. Only a small number of farmers recognised natural enemies. During the interview, no farmer reported the use of chemical control. This was consistent with observations of the staff at the agricultural research station.[7] The respondents practised a range of local control methods for the major pest and diseases problems they encountered. In this section, I discuss farmers' control practises in the light of experience elsewhere and the implications for FFS curricula.

CMB

More than half of the respondents recognised the symptoms of CMB attack and the majority of them (84%) were aware of the damage, yet half of them did not take action. Removal of the tips, mentioned by 10%, is not recommended by the agricultural extension staff.[8] *Tephrosia vogelii* is a botanical insecticide (Gaskins, White et al. 1972). This plant is also recommended in Malawi as a shade plant and for enhancing soil fertility. The possible negative correlation between higher CMB infestation and low soil fertility was recognised in the field, but would require detailed data for confirmation (Neuenschwander, Hammond et al. 1990). Some of the respondents did not consider it as a problem, which may suggest that they have not experienced a severe attack. The CMB was still considered as the greatest threat to production by farmers even after the introduction of the biological control agents. A technician at agricultural research station observed that biological control agents were released only in selected parts of Karonga District and did not establish well in the study area,[9] possibly due to the reasons mentioned above.

[7] Mleta, H. and Benesi, I.R.M., interview by author. 11/10/2008, Chitedze Research Station.
[8] Mleta, H., interview by author. 29/08/2008, Chitedze Research Station.
[9] Mleta, H., interview by author. 29/08/2008, Chitedze Research Station.

ACMD

The term used in the Central Region of Malawi (*khate la chinangwa*), also occasionally used in the research area, suggests human leprosy, a link which has been noted also in Ghana (Manu-Aduening, Lamboll et al. 2007).

Although ACMD was found to be widespread, and we observed the symptoms in the field, 44% of the farmers said they did not know what it was. As for control measures, a total of nearly two-thirds of the total respondents (64%), did not take any action, either because of not knowing what to do or not considering it a problem, and the difference between FFS and non-FFS farmers was small (FFS: 68%, non-FFS: 61%). Roguing the affected plants was mentioned by some (15%) but only half of them practised it. The reasons for not uprooting were to secure enough food as well as planting stems for the next season. It has been shown that different varieties give different responses to cooking qualities as a result of infection (Thresh and Cooter 2005). Two women farmers (4%) favoured some of the infested local varieties because of the taste and cooking qualities of the tubers.

Farmers have low awareness of the role of vectors in disease transmission. Only a few (6%) farmers noted the relationship between ACMD and whitefly nymphs. Adult whiteflies are difficult to be spotted because they are small and easily fly away when approached. Even when they know the relationship between ACMD and whitefly, it would still be difficult for farmers to perceive the economic gain by controlling whiteflies (Kekeunou, Weise et al. 2006). The studies on transmission efficiency showed that only 4.4-13% of whitefly adults are infectious (Dubern 1994; Maruthi, Colvin et al. 2002; Legg and Fauquet 2004). However, considering that CBSD is also transmitted by whitefly vectors (Maruthi, Hillocks et al. 2005), the role of whitefly could be addressed in FFS trainings. For example, work in Malawi on malaria prevention found that over half (55%) of their respondents identified mosquitoes as causal agents (Ziba et al. 1994). Other studies have found that there is continuity between notions of the health of the human body and the health of crops and the natural environment (Niehof and Price 2008).

A number of plants infested by both ACMD and CGM were observed during the field visits with farmers. In these cases, it was not possible to strictly distinguish whether the farmer was talking about injuries by either ACMD or CGM.

Although the farmers interviewed did not particularly emphasise the benefits of intercropping, half (51%) of the areas planted to cassava were intercropped with maize. There could be a positive impact in terms of reducing the whitefly population. Intercropping cassava with cowpeas has been shown to reduce the egg populations of two whitefly species, *Aleurotrachelus socialis* and *Trialeurodes variabilis*, in Columbia (Gold, Altieri et al. 1989).

The effect of wind on ACMD infestation was mentioned by one FFS-farmer. Fauquet and Fargette (1990) indicated that the spread of ACMV correlates with the distribution of vectors and the general direction and turbulence effect of the wind, namely upwind edges of the field can have a higher disease incidence than downwind edges (Fauquet and Fargette 1990; Fargette and Thresh 1994; Thresh and Cooter 2005). Gaps in the crop canopy also increase incidence where viruliferous vectors can easily establish (Fargette, Muniyappa et al. 1993; Fargette and Thresh 1994). In mixed cropping systems, crops such as maize and sorghum might provide a barrier against whitefly spread into the cassava crop, particularly if grown at the windward edge of the field where plants are more likely to be infected by ACMD (Fargette, Thouvenel et al. 1987; Hillocks 1997).

Elegant grasshopper and eating habits

The majority (63%) of the farmers knew the Elegant grasshoppers as crop pests and about half (27%) killed them manually. Physical control was also the most commonly practiced method against Variegated grasshoppers in southern Cameroon (Kekeunou, Weise et al. 2006). According to the respondents, it appeared that nobody eats Elegant grasshoppers in this area. Ten percent of them said they have never heard that the Elegant grasshoppers are edible; 6% said the insect is not considered to be a foodstuff due to its foul smell. On the contrary, it is considered edible by women and children in some parts of southern Malawi, such as the Shire Valley area, where they are eaten in large quantities (Williamson 1992; Morris 2004), as well as in other parts of Africa (van Huis 2003). The glands that exude the fluid with offensive smell are removed before the insect is prepared as food in some parts of Malawi.[10] In Cameroon and Nigeria, *Z. variegates* adults are eaten after being fried (Iduwu and Modder 1996; Kekeunou et al.

[10] Nyirenda, G.K.C., interview by author. 07/10/2008, Lilongwe.

2006; Page and Richards 1977) and is also used as bait for fishing (Kekeunou, Weise et al. 2006). Instead, some farmers in Chilumba referred to the 'edible grasshopper' *Ruspolia nitidulus vicinus* as food (van Huis 2003). They are locally called *Nthefunthe* in the Northern Region and *Bwanoni* in the Central Region of Malawi. In the lakeshore areas, lakefly (Chironomidae and *Chaoborus* spp.) (Corbet 1958) are also commonly eaten and sometimes traded. Diverse roles of insects in the socio-cultural life of the people of Malawi, such as food or medicine, were elaborated in the work of Morris (2004).

Acquisition and management of stem cuttings

There was some degree of awareness among the farmers of the importance of plant sanitation, particularly roguing and using healthy planting stems. However, approximately a third took no action to ensure that the stems were healthy.

Careful visual selection, looking at the presence of the leaf symptoms has been effective in Africa including Malawi (the late R.F.N. Sauti, unpublished data, cited in Thresh and Cooter 2005). However, selecting 'healthy stems' as a disease control method poses a difficulty for farmers because ACMD is not visible on the planting stems once the leaves are removed. Farmers are therefore often unaware of the infection of stems obtained from various sources. Another complication is that one branch of a plant could be showing symptoms while the other part of the same plant could appear to be free of infection. In this case, it is highly possible that the entire plant is infected and therefore it is not recommended to use it as planting material.[11] Phytosanitation by strict labelling, monitoring, and roguing of the primary infestation of the crop at early planting stages would be an effective way to control ACMD and CBSD in Africa (Thresh and Cooter 2005).[12] Although phytosanitation was not a major recommendation in the 1990s when the ACMD expanded rapidly in the region (Legg 1999), it could be a viable option for subsistence farmers, particularly after the widespread distribution of improved cultivars in the study area. In addition, the development of simple and sensitive methods for farmers' use is under way to ensure health status of planting materials at minimum effort and costs (Thresh and Cooter

[11] Peters, D., interview by author. 20/11/2008, Wageningen.
[12] Peters, D., interview by author. 20/11/2008, Wageningen.

2005). There is a potential to promote phytosanitation as a disease control measure through activities such as FFS, supported by a monitoring system at a wider level.

Varietal selection and preferences

Over half of the farmers (58%) in this area had access to improved varieties. FFS farmers had better access (74%) compared to the non-FFS farmers (48%). Eight percent of the total respondents, all non-FFS farmers, said that they do not have enough planting materials.

Local names for both local and improved varieties reflect how farmers consider each variety. For example, '20:20' represents 'numerous small tubers', '*matakolembwende*' literally means 'bobbing buttocks'. It appeared that none of the local names referred to the plant health or tolerance to pests and diseases.

With the release of improved varieties resistant to pests and diseases, it should be taken into account that they still may become infected, only that their symptoms are less obvious.[13] Also, the insufficient availability of stem cuttings and breakdown of the resistance could cause a problem. Only limited information is available on the performances of many of the TMS varieties released as ACMD-resistant by IITA, and some of these varieties showed substantial yield loss when infected (Thresh and Cooter 2005). Survey results by IITA in East Africa indicated the gradual breakdown of ACMD resistance in some of the improved varieties released to the farmers (Ntawuruhunga 2007). This implies that the use of 'resistant' cultivars against virus diseases would require a continuous effort.

Eating quality of cassava leaves as vegetables

Thirty-five percent of the farmers confirmed that they eat cassava leaves (locally called Chigwada) as vegetables, even if the leaves are affected by ACMD. Almazan and Theberge's study (1989) in Zaire indicated that the affected leaves are favoured as a vegetable because the concentration of cyanide and protein declines with the progression of the disease; farmers perceive this as increased relative 'sweetness',[14]

[13] Peters, D., interview by author. 20/11/2008, Wageningen.
[14] Mahungu, N.M., interview by author. 21/04/2007, Lilongwe.

although the sugar content is not affected (Almazan and Theberge 1989; Chiwona-Karltun 2001). It is however logical that virus infection increases the sugar content in leaves because the sugar transmission system from the leaves to tubers is disturbed due to viral infection.[15] In our study, no farmers attributed their consumption of the affected leaves to 'sweetness' but 4% of farmers suggested 'sourness' (a quality not always regarded as favourable), a flavour which is referred to as being like the flavour of local lemons (*Citrus limonium*; locally called *mandimu*). On the other hand, 61% of the farmers suggested that such leaves are not palatable, bitter, diseased, bad, poisonous and unfit for eating because of the 'white stuff' at the back of the leaves (possibly referring to whitefly nymphs). Four percent of the farmers (11% of the male respondents) said they did not know since their wives were the ones responsible for selecting the leaves. Women were not only the major operator of the tasks around cassava production but also responsible for the household food security. Thus, their role needs to be represented in cassava FFS trainings.

Since approximately a third of the farmers surveyed indiscriminately harvest infected leaves as vegetables, it would be unreasonable to expect them to rogue out affected plants – unless, perhaps, a substitute vegetable that would meet local taste preferences could be grown. Likewise, spraying of chemicals would not be an option either due to this reason. This suggests that an integrated approach to the management of pests and diseases is necessary.

Implications for FFS curricula

Our result suggests that farmers' participation in FFS sessions has not had a major impact on their perceptions and control measures. At the time of interview in 2007 and 2008, one FFS on cassava was running, although not actively. This group almost ceased due to the failure to locate an appropriate communal plot for experimentation, the loss of chairperson, and the relocation of the extension worker as a facilitator.[16] FFS on rice generally attracted more interest, which is represented by the greater number of the graduates from rice-based FFS. The farmers show higher motivations to

[15] Peters, D., interview by author. 20/11/2008, Wageningen.
[16] Kamwendo, N.D., interview by author. 02/09/2008, Chilumba.

protect cash crops with shorter planting period rather than subsistence food crops with a long growing cycle.

With respect to smallholder farming in Africa (Orr 2003), and with respect to maize in Malawi (Orr and Ritchie 2004), studies have shown that pest and disease management is not a priority issue for smallholders. Because two of the major insect pest problems of cassava in Malawi have been successfully contained by classical biological control without farmers' involvement, the researchers have argued that the participation by the farmers in IPM is not always essential (Orr 2003) and consider that IPM not to be an effective entry point in the design of farmer education curricula because very little synthetic pesticides are used and farmers are not market-oriented. IPM experiences on cassava in Zanzibar suggest that emphasising agronomic practices was more relevant than focusing on interactions between pests and natural enemies (Bruin and Meerman 2001). These points have been discussed elsewhere (van den Berg and Jiggins 2007). Our findings suggest that, when pests and diseases in cassava are clearly visible and perceived as causing significant losses, some of the farmers may try to control them.

So far in Malawi, cassava-based FFSs or FFS that include cassava in the curriculum, address only a limited range of cassava crop protection issues. In the Chilumba area, cassava-based FFS focused on a few agronomic practices: differences in yield using different plant population and improved and local varieties (Kamwendo 2007). Pests and diseases form only a small part of the overall curriculum and only a limited range of management options are considered (Table 2-4).

Based on the findings presented here, a better integration of pests and diseases into an integrated approach to improved cassava crop management could be possible. Yet as Table 2-5 shows, there are constraints and not only opportunities to this.

Table 2-4 Summary of the 'IPM' component in cassava, rice and maize-based and crop-based FFS curriculum in Chilumba

Cassava-based FFS: curriculum content	Examples of Learning Exercises	Crop (rice and maize) - based FFS: curriculum content	Examples of Learning Exercises
Plant population	Yield study, it was found that traditional mounds can give higher yield than ridges.	Manure application on rice	Yield study, it was found that 23:21:0+4S can be replaced by manure application
Variety	Yield study (pests and disease resistance of improved varieties)	Application of *Tephrosia vogelii* extract	Yield study
		Application of herbicides Roundup® and bullet on weeds in maize	Yield study
		Spraying *Cypermethrine* on stalkborer in maize	Yield study
		Spraying *Dursban* on grasshopper in rice	Yield study
		Spraying of *Sevin* on stalkborer in maize and grasshopper in rice	Yield study

Source: participant observation (Chilumba 02/2007); KI interviews (Chilumba 09/2008)

Table 2-5 Summary of constraints to and opportunities for addressing cassava pests and diseases in FFS curricula

Pest/ disease	Constraints	Opportunities	Implications for FFS curricula
ACMD	- Concept of vector not easily understood. - Whitefly adults fly away easily and difficult to be recognised. - Symptoms often confused with CGM. - Wilted leaves a preferred vegetable for farmers. - Food security deters roguing of infected plants. - Recycling of planting stems widely practised. - Infected planting stems not detectable. - Not enough planting materials of improved varieties available.	- Perceived as a problem by the majority of farmers. - Some understand stem cuttings or the varietal traits are the reasons. - Whitefly nymphs are known by some farmers. - Some know that roguing will control the disease.	- Varietal trials (local and improved) for susceptibility. - Comparison of using infected and non-infected cuttings. - Observation of whitefly vectors (nymphs and adults). - Selection of healthy cuttings. - Effect of early planting. - Effect of roguing on yield and on planting stems. - Implication of phytosanitation on food security. - Consideration of substitute green vegetables. - Sensory test of wilted and healthy leaves when cooked (*chigwada*).
Mealybug	- Some only remove tips although not recommended. - Food security deters roguing. - The population reduces with the start of rainy season. - Some farmers think that honeydew is beneficial for improving soil fertility. - Not enough planting materials of improved variety are available.	- Widely known as a problem, though cause unknown and nothing is done. - Affected plants are easily spotted.	- Varietal trials (local and improved) for susceptibility. - Effect of removing tips and roguing on yield and on securing planting stems. - Discuss food security issues. - Why does prevalence changes before/ after the rains. - Honeydew is beneficial to soil?
Elegant grasshopper	- Not always present. (Years of outbreak, only at the onset of rainy season, localised population.)	- Widely recognised by farmers. - Damage by feeding on crops is clearly understood. - Easily spotted.	- Observations at the onset of rains (including surrounding areas). - Assess effectiveness of farmers control practices (e.g., application of *Tephrosia vogelii*).

Source: field sampling (10/2006); mapping method (09/2007 & 09/2008); *Bawo* exercise (09/2007 & 09/2008); KI interviews (09/2008), Chilumba

Table 2-5 indicates that the greatest opportunities, in the conditions described in this study, lie in the incorporation of the following elements into the curricula of cassava-based FFS.

- Phytosanitation by improved planting stem management and acquisition arrangements for accessing healthy planting stems
- Concept of vectors and disease transmission
- Varietal susceptibility trials, farmers' local preferences and improved varieties
- Pest recognition, in particular field observation and identification of whitefly, CGM, CMB, Elegant grasshopper, and their natural enemies
- Consideration of a substitute green leaf vegetable
- Cost implications of the injury of pests and diseases

Due to high social and climatic risks envisaged in countries like Malawi, technical solutions available for FFS need to be supported by continuous investment in institutional and human capacity development.

Conclusions

Our work shows that FFSs on cassava have had limited impact on farmers' perceptions and practices in northern Malawi. Apart from the localised attack of Elegant grasshopper, the major pests (CMB and CGM) are contained by classical biological control, while the most important diseases (ACMD and CBSD) could be effectively controlled by promoting phytosanitation. Based on more thorough understanding on farmers' perceptions and crop management practices, there is more work to be done on varietal trials and farmer training, particularly on curriculum design of FFSs based on subsistence food crops in Africa. Continuous investment in institutions and human capacity development to sustain this effort is essential.

3 Family trees and coping strategy analysis of AIDS-affected households in rice- and cassava-based farming systems in northern Malawi

Midori Yajima[17]

Abstract

The study is based on in-depth repeat interviews and survey data on cropping systems with 30 respondents in three locations in rice and cassava cropping areas in northern Malawi. The numbers affected by AIDS in this part of the country have been relatively high. The cassava growing areas, including the study area, are among the most cash-poor, although irrigated rice production at the Hara scheme, and fishing in Lake Malawi offers for some households a significant source of income. AIDS impact among households in different livelihood systems was assessed and family trees of respondents were examined in order to explore the 'threshold of social immunity'. Respondents included those declaring themselves affected and those considered to be affected on the basis of symptoms and family deaths as well as those reporting being non-affected. The respondents' serostatus was not further verified. The analyses of the genealogical data using the software package Legacy showed the coping responses to a range of opportunities and stresses in the area. Diversified sources of support could be read as a sign of a breakdown in extended family networks beyond the 'coping threshold' level. Although the impact of AIDS was evident on the personal level, the overall AIDS-related risks could be regarded as one in a continuum of other risks. In such contexts, treating AIDS impact as the decisive factor in household coping appears over-stated. Detailed study is required to understand alternative livelihood strategies in the face of multiple stresses.

Keywords: AIDS, impact, Malawi, rural household, family tree analysis, livelihood system

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[17] Submitted in October 2009

Introduction

In 2007, the adult HIV prevalence in Malawi was estimated to be 12% overall: 16% in urban centres and 11% in rural areas (Office of the President and Cabinet 2007). A study in rural Malawi concluded that 76% of the deaths could be regarded as AIDS deaths (Doctor and Weinreb 2003). The depletion of the major productive age population has compromised agricultural production, inducing shifts in food security, labour allocation, cropping systems, and land husbandry (Barnett, Tumushabe et al. 1995; Topouzis 1999; Baylies 2002; Shah, Osborne et al. 2002; de Waal and Whiteside 2003; Drinkwater 2003; Müller 2004). The situation poses a great challenge for development in all sectors, including smallholder food production (de Waal and Tumushabe 2003).

The rural areas of the Karonga District in northern Malawi, where the study was conducted, witnessed the earliest confirmative signs of AIDS and adverse socio-economic impact of 'the silent epidemic' (Iliffe 2006). Geographic proximity to the Tanzanian and Zambian borders and active migrant flow into and out of the district are thought to be likely causal factors (Iliffe 2006). Surveys conducted in 1999-2001 showed the female HIV prevalence in Karonga District to be 15% (Crampin, Glynn et al. 2003), higher than the projected average figure for rural Malawi at 12% (Malawi National AIDS Commission 2003). At the time of the study, both voluntary counselling and testing (VCT) and antiretroviral therapy (ART) were becoming accessible at government clinics and mission hospitals within the locality (Office of the President and Cabinet 2007).

The aim of the study is to understand the impact of AIDS among households in Karonga District. The focus is to explore family trees, crop patterns, and food security in order to understand AIDS' role in relation to the 'threshold of social immunity'. Social immunity is defined by Mtika (2001) as the 'the ability of a collective of people, specifically the extended family, to mitigate the impact of an affliction'. HIV/AIDS, with its 'dual effect', first activates and then weakens social immunity once the threshold level is crossed (Mtika 2001; Beraho 2008). Examination of family trees allows analysis of household responses to the impact of AIDS when the experienced stress surpasses the capacity of the traditional support structure.

Methods

Research setting and data collection

The study was conducted in Chilumba from December 2005 to October 2008. The information is based on semi-structured interviews (SSIs) and repeat (2-3 rounds) in-depth interviews (Patton 1980), each of 3 hours or more per respondent, with 30 individuals in three locations (10 in each location). The validity of such qualitative research with a limited number of respondents has been debated but is rigorously grounded in the sciences (Reason and Rowan 1981) in ways that increase relevance, legitimacy and depth of meaning, an approach that can be especially powerful when complemented with evidence from larger scale or statistical approaches.

The locations were purposively selected, based on different livelihood compositions:
(1) Mwandovi village: cassava as a subsistence crop, fishing for food and income;
(2) Kachere village: cassava as a subsistence crop, some rice and tobacco grown for cash income;
(3) Hara Irrigation Scheme: rice as a cash crop.

The first part of the study established major crop risks, based on respondents' perceptions of cassava pests and diseases. Methods used included 'crop mapping' based on SSIs concerning landholding size, crop and labour allocation, and food security (Chapter 2). A sub-sample of 10 respondents, five from locations (1) and (2), was randomly selected from the respondents who had participated in the first part of the study. The survey was repeated in the third location (3) with an additional 5 randomly selected respondents. The cropping data were analysed using SPSS. The level of AIDS impact for each respondent was then estimated, using the guidelines discussed in the results section.

Thereafter, local key informants (agricultural extension staff, a secretary of a farmers' group, and a deputy village head) were requested to identify a further fifteen individuals, five from each location. Based on the relationships built up by our presence in the communities between 2005 and 2007, we asked our informants to confide to us their observations of who might be impacted by AIDS because of their health status or the sickness and deaths of their close kin, or who were looking after orphans as a result. Serostatus was not further verified. All individuals identified by the informants agreed to be interviewed. Every effort was taken to remove stigmatisation,

misinformation, or expectation of benefit. The first part of the study was repeated with the additional fifteen, yielding a total of 30 respondents.

The second part of the study then was conducted, based on two or three repeat interviews with the 30 respondents, comprising main narration (Chapter 5), a SSI focusing on AIDS, construction of life history chronologies, and drawing of family trees (Deshpande 2005). The family trees were first drawn together with respondents on flipchart sheets (Figure 3-1). The data on family members included whoever respondents perceived as part of their family. Thus, the information did not necessarily include all biologically related members nor reflect residential arrangements. 'Official partnerships' in this case included respondents' past and present marriages, unmarried relationships resulting in children, and reported relationships between male sponsors who were providing support for distant female partners. For each person mentioned during the family tree exercise, the name, relationship to the respondent, birth year, information on livelihood, and (if applicable) year and cause of death were recorded where possible. Thereafter, follow-up interviews were conducted with all respondents on perceptions of AIDS impacts, changes in landholding size or crop selection over the past years, whether they took care of orphans, assets and property changes, and access to assistance, if any.

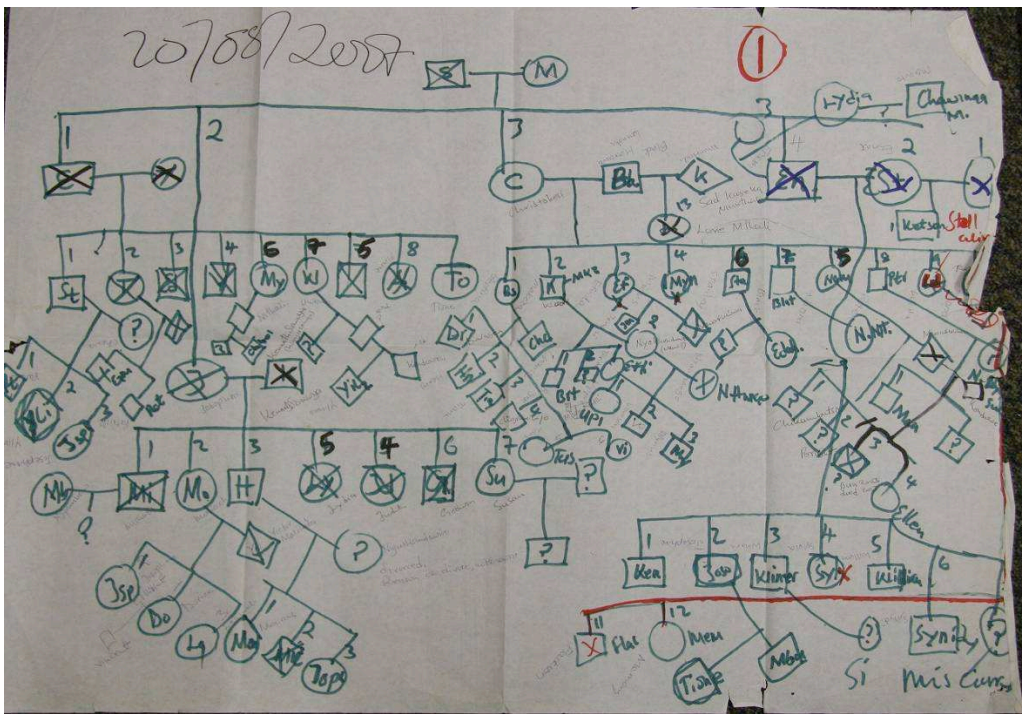

Figure 3-1 Family tree drawing on flipchart sheet
Source: Respondent #4, 20/08/2007, Chilumba

The family trees (N=30) were entered and analysed using a genealogical software, Legacy (version 7.0 Millenia 2008). With the supporting information from the narration and chronology, family trees were displayed as descendant charts using Legacy software.

All respondents authorised the recording of their responses. All responses were given in the local language (*ChiTumbuka*) and written notes were maintained in English with the help of research assistants. All identities in this paper are expressed in pseudonyms.

Results

Profile of respondents

The 30 respondents comprised 19 women and 11 men between 27 and 80 years old, with an average of 49 years old. All respondents had married: 17 respondents were in monogamous marriages, 6 had been widowed, 5 were in polygynous marriages (involving 1-5 co-wives), and 2 had divorced (Table 3-1).

Table 3-1 Respondents' profile and assessment of AIDS status

#	M/F	Age	Location	Marital status	Researcher's categorisation of impact status (1)	Respondents' perception on impact status (2)	(1) and (2) combined
1	F	32	K	Married (monogamy)	Non- affected	Non-affected	Non-affected
2	M	27	K	Married (monogamy)	Non- affected	Non-affected	Non-affected
3	F	38	K	Married (polygyny)	Non- affected	Non-affected	Non-affected
4	F	50	M	Married (monogamy)	Non- affected	Affected	* conflicting case
5	F	51	M	Divorced	Non- affected	Non-affected	Non-affected
6	M	64	M	Married (monogamy)	Non- affected	Non-affected	Non-affected
7	M	80	M	Married (monogamy)	Non- affected	Non-affected	Non-affected
8	F	36	S	Married (polygyny)	Non- affected	Non-affected	Non-affected
9	M	60	S	Married (monogamy)	Non- affected	Non-affected	Non-affected
10	M	49	S	Married (monogamy)	Non- affected	Non-affected	Non-affected
11	M	43	K	Married (monogamy)	Primary	Affected	Affected (Primary)
12	M	53	K	Married (monogamy)	Primary	Affected	Affected (Primary)
13	F	39	M	Married (polygyny)	Primary	Affected	Affected (Primary)
14	F	48	M	Divorced	Primary	Non-affected	* conflicting case
15	M	37	M	Married (monogamy)	Primary	Affected	Affected (Primary)
16	F	61	M	Widowed	Primary	Affected	Affected (Primary)
17	F	45	M	Married (monogamy)	Primary	Affected	Affected (Primary)
18	M	40	S	Married (monogamy)	Primary	Affected	Affected (Primary)
19	F	33	S	Widowed	Primary	Affected	Affected (Primary)
20	F	44	S	Married (polygyny)	Primary	Affected	Affected (Primary)
21	F	57	S	Widowed	Primary	Affected	Affected (Primary)
22	F	63	K	Widowed	Secondary	Affected	Affected (Secondary)
23	F	54	K	Married (polygyny)	Secondary	Affected	Affected (Secondary)
24	F	46	K	Married (monogamy)	Secondary	Affected	Affected (Secondary)
25	F	70	K	Married (monogamy)	Secondary	Non-affected	* conflicting case
26	F	37	K	Widowed	Secondary	Affected	Affected (Secondary)
27	M	49	M	Married (monogamy)	Secondary	Affected	Affected (Secondary)
28	F	65	S	Widowed	Secondary	Affected	Affected (Secondary)
29	F	51	S	Married (monogamy)	Secondary	Affected	Affected (Secondary)
30	M	36	S	Married (monogamy)	Secondary	Affected	Affected (Secondary)

Dissolving the threshold between 'affected' and 'non-affected'

Shortly after the beginning of the study, the difficulty of distinguishing between 'affected' and 'non-affected' individuals based on reputational sampling was recognised. For example, an elderly man included in the sample was thought by others to be adversely impacted, but our interview revealed that his difficulties in cultivation were related to his age rather than AIDS status or impact. We therefore established the following guidelines for sorting our respondents.

Group 1 (no evident impact/ 'non-affected'): 10 respondents (5 female, 5 male)
He or she reported that either they had had a blood test with negative results or did not report their serostatus, but had no known AIDS cases in their family trees.

Group 2 (primary level impact: assumed as 'people living with HIV/AIDS': PLWHA): 11 respondents (7 female, 4 male)
He or she reported that they had had positive results from the blood test or had known AIDS cases among their previous official partners (including former spouses).

Group 3 (secondary level impact): 9 respondents (7 female, 2 male)
He or she did not report their own serostatus, but reported known AIDS cases in their family trees.

Based on these observations, we tentatively allocated respondents to group 1 (10 respondents: 5 female, 5 male) as 'non-affected', and combined groups 2 and 3 (20 respondents: 14 female, 6 male) as 'affected'.

Thereafter, we checked this categorisation by means of a question asked during follow-up interviews, concerning whether the respondents considered themselves as affected. The result was as follows:

Group A (no perceived impact): 11 respondents (6 female, 5 male)
Group B (impact perceived): 19 respondents (13 female, 6 male)

The two results, namely categories based on the researcher's guideline and self perceptions of impact, are compared in Table 3-2.

Table 3-2 Respondents and estimated HIV status categories based on the researcher's guideline and self perception of impact

N=30	Impact perception	Female (N=19)	Male (N=11)
1 No evident impact (N=10)	A: Yes	1	0
	B: No	4	5
2 Primary level impact (N=11)	A: Yes	6	4
	B: No	1	0
3 Secondary level impact (N=9)	A: Yes	6	2
	B: No	1	0

We concluded that the respondents in group 1/B could safely be described as 'non-affected', and combined the respondents in group 2/A (primary level impact with impact perception) and in group 3/A (secondary level impact with impact perception) as 'affected'. For the purpose of statistical analysis, three cases where the information conflicted (numbers 4, 14, 25 in Table 3-1; corresponding to 1/A; 2/B; 3/B in Table 3-2 respectively) were excluded. The final categorisation gave the following:

Group 1/B (non-affected): 9 respondents (4 female, 5 male),
Group 2/A (affected: primary level), and
Group 3/A (affected: secondary level): 18 respondents (12 female, 6 male).

The reported size of family trees recognised by the respondents ranged between 18 and 208 members, with a mean of 93 members, stretching over 3 to 5 generations. Even though the youngest respondent (27 years) indicated the smallest family size (18 members) and the oldest respondent (80 years) the largest family size (208 members), the respondent's age did not show significant correlation ($p \leq 0.05$) with the reported size of family trees.

Impact of AIDS on family trees

Correlations between the affected groups (2/A and 3/A) and non-affected group (1/B) were analysed by the following variables: age, size of extended family, number of deaths/ AIDS deaths, number of official partnerships, and number of children/lost children (N=27). The only variable with significant correlation ($p \leq 0.05$) between the two groups were the number of AIDS deaths (Table 3-3), which was used as a basis of grouping.

Table 3-3 Family profiles based on 'affected' and 'non-affected' groups and cash cropping

		AIDS status (N=27)[1]		Cash cropping (N=29)[2]	
		Affected	Non-affected	Yes	No
Age		47.4±9.8 (18)	48.6±17.2 (9)	46.8±11.2 (16)	48.5±11.4 (13)
Family tree size		87.3±40.5 (18)	96.0±75.5 (9)	83.4±29.9 (16)	89.5±50.4 (13)
Number of deaths	Total	16.7±11.9 (18)	14.9±7.6 (9)	15.1±7.5 (16)	18.2±14.0 (13)
	AIDS	0.7±0.8 (18)*	0.0±0.0 (9)*	0.6±0.8 (16)	0.6±1.2 (13)
Number of official partnerships		1.9±1.1 (18)	2.0±1.1 (9)	1.6±1.1 (16)*	2.5±1.1 (13)*
Number of children	Total	6.9±3.3 (18)	6.2±3.4 (9)	7.3±3.1 (16)+	5.6±2.2 (13)+
	Lost	1.8±2.0 (18)	0.7±1.0 (9)	1.8±1.6 (16)*	0.7±1.9 (13)*

1) N=30-3 (conflicting cases)
2) N=30-1 (case without cropping)
Notes: Kruswal-Wallis test
*: p≤0.05 (significant);
+: 0.05≤p≤0.10 (weakly significant)

Impact of involvement in cash crops on family trees

We re-grouped the respondents based on their involvement in cash cropping or subsistence crops to see whether there was a relation with the family profile. One respondent in Mwandovi village was not cultivating crops at the time of the study; thus was excluded from the analysis on cropping (N=29). Fifty-five percent (16/29) of the total respondents were involved in cash cropping: 9 in the Hara rice irrigation scheme (all growing rice), 6 in Kachere village (5 growing rice in Hara scheme; one growing tobacco), and 1 in Mwandovi village (rice). The remaining 45% (13/29) of the respondents were growing only subsistence crops (cassava, maize): 1 in Hara scheme, 4 in Kachere village, and 8 in Mwandovi village.

The two variables with significant correlations between the two groups were the number of official partnerships and lost children (p≤0.05); the total number of children showed weak significance (p≤0.10, Table 2). The respondents in the cash crop group reported a fewer number of partners but a greater number of lost children compared to those in subsistence crops. Other variables such as size of family trees, total deaths, and AIDS deaths did not show any relation with the growing of cash crops.

Cropping patterns and food security based on 'crop mapping'

The landholding size and crop allocation, use of *ganyu* (casual hired labourers) on their plots, food security based on impact level (N=26), and cash cropping (N=29) are shown in Table 3-4.

Table 3-4 Landholding size and crop allocation based on 'affected' and 'non-affected' groups and cash cropping

	AIDS status (N=26)[1)]		Cash cropping (N=29)[2)]	
	Affected	Non-affected	Yes	No
Total landholding size (Ha)	1.5±1.0 (18)	1.5±0.8 (8)	1.6±0.9 (16)	1.3±0.9 (13)
Maize (Ha)	0.1±0.2(18)	0.1±0.2 (8)	0.2±0.2(16)+	0.0±0.1 (13)+
Cassava (Ha)	0.4±0.6 (18)	0.5±0.7 (8)	0.3±0.3 (16)	0.7±0.9 (13)
Maize and cassava (Ha)	0.6±0.5 (18)	0.6±0.5 (8)	0.6±0.5 (16)	0.6±0.4 (13)
Rice (Ha)	0.3±0.6 (18)	0.2±0.3 (8)	0.5±0.6 (16)*	0.0±0.0 (13)*
Tobacco (Ha)	0.0±0.1 (18)	0.0±0.0 (8)	0.0±0.1 (16)	0.0±0.0 (13)
Other crops (Ha)	0.1±0.4 (18)	0.0±0.0 (8)	0.1±0.4 (16)	0.0±0.0 (13)
Ganyu[3)]	0.5±0.5 (18)	0.3±0.5 (8)	0.6±0.5 (16)+	0.3±0.5 (13)+
Food security[4)]	0.7±0.5 (18)	0.8±0.5 (8)	1.0±0.0 (16)*	0.5±0.5 (13)*

1) N=30-4 (conflicting cases+ case without cropping)
2) N=30-1 (case without cropping)
3) Use of *ganyu* labourers (1=yes, 0=no)
4) Self assessment of food security (1=food secure, 0=food insecure)

Notes:
*: p≤0.05 (significant);
+: p≤0.1 (weakly significant)

None of these variables showed statistically significant correlation with AIDS impact level. *Kukomalizya* (i.e., a labour exchange in a friendly arrangement, by inviting neighbours and friends to assist in short-term field work, with meals provided in recompense) was observed for three affected households (1 in primary level; 2 in secondary level). Cash cropping significantly correlated with rice crop. The proportion of respondents in the cash crop group using *ganyu* (63%; 10/16) was higher than those in the non-cash crop group (31%; 4/13).

The mean of the food security indicator (sufficient=1, insufficient=0) was similar for the non-affected (0.75) and the affected (0.72). Those reporting 'food insecure on the basis of their own production' commented that their food gaps are filled by other income sources, namely fishing, remittances, business (bicycle taxi, grocery, carpentry,

and selling reed mats) and from employment (one respondent) and *ganyu* labour. Twenty-seven percent (4/15) of the respondents who are included in the affected category (1 at primary and 3 at secondary level) reported themselves as food secure, commenting that their food gaps are bridged by cassava. The respondents in the cash crop group reported significantly higher food security than the non-cash crop group.

Changes in landholding size and cropping pattern

In follow-up interviews, 61% (11/18) in the affected category reported that they had reduced the size of cultivated land due to their lack of strength or illness, or of their family members, or deaths. One respondent who had not reduced the size nonetheless mentioned that he feels that the labour demand is becoming tough due to his ill health. Altogether, 67% (12/18) in the affected category perceived cultivation as an increasing burden. Seventeen percent (3/18) of the respondents in the affected category who reduced their land size mentioned that they could not continue growing labour-intensive crops, such as hybrid maize, rice and tobacco, and that they would focus on local maize and cassava instead. Of the respondents in the non-affected category, only one mentioned that she had reduced the size of cultivated land because of her child's sickness.

Orphans, discrimination, assets and assistance

Eighty-three percent (15/18) of the respondents in the affected category had ever taken care of orphans on a long-or short-term basis, compared to 67% (6/9) in the non-affected category. Of the respondents in the affected category, 28% (5/18) reported that they were not treated well by the community – they felt either ridiculed or regarded with enmity – while all the respondents in the non-affected category answered that they are treated well or fairly. About 40% (7/18) of the respondents in the affected category reported that they had sold assets (livestock, trees) or farm produce to cover medical and funeral costs or to repay the loans left by the deceased. Eleven percent (2/18) of the respondents in the affected category had experienced 'property grabbing' as a result of deaths in the family and there was one reported case among the non-affected following the death of a well-to-do individual. Half (9/18) of the respondents in the affected category had received some kind of external assistance: 3 from the government, 2 from Malawi Red Cross, 2 from churches, 2 from NGOs, 1 from the community, and 1 from a brother (multiple answers). Twenty-two

percent (2/9) of the respondents in the non-affected category reported assistance: 1 from the government and 1 from a brother.

Analysis and discussion

Family trees and AIDS impact

The result of comparison between impact levels, based on both pre-defined AIDS status and impact perceptions, showed no significant correlation by the variables analysed. Contrary to expectation, AIDS impact appears to have little impact on family composition. Therefore, assessing the degree of socioeconomic impact by the 'face value' seems insufficient. The data used to categorise the 'impact level' of the respondents, namely the self reported serostatus, AIDS deaths and impact perceptions, are not easily collected and verified, particularly when there is stigma and discrimination. Such information inevitably carries an unknown degree of uncertainty and ambiguity. Thus, no sharp boundaries could be drawn along the analytic continuum in terms of the severity of impact in the study area.

Cropping patterns and cash cropping

The 'New Variant Famine' hypothesis by de Waal and Whiteside drew on data from Malawi and Zambia and suggested that a progressive increase in cassava production (FAOSTAT 2009) is an indication of AIDS impact (de Waal and Whiteside 2003). The hypothesis assumes that, as the available farm labour is reduced, it is likely to be directed towards less labour-intensive root crops such as sweet potatoes and cassava, thereby compromising nutritional values (de Waal and Tumushabe 2003; de Waal and Whiteside 2003).

In our study, shifts in crop selection and labour allocation (Gillespie 2006) indeed were observed. The individuals in the affected category tended to reduce the size of cultivated land, drop cash crops, fill their food gaps with cassava, and rely more on *ganyu* income. One respondent (affected, primary) expressed the necessity to send orphaned boys to other people's fields as *ganyu* labourers to buy food, a phenomena also observed in other studies (Bryceson 2006). Another form of labour sharing, *kukomalizya,* was adopted by some of the affected households as an alternative pathway to maintain productivity.

The access to cash crops showed significant correlations in such variables as food security and use of *ganyu* labourers. In addition, some respondents reported off-farm income sources such as fishing, wages, and remittances. The respondents in Kachere village have additional income opportunities due to its proximity to Uliwa trading centre (about 3 kilometres). Further analysis of livelihood systems, based on life history narrations, is reported separately (Chapter 5). Overall, our findings suggest that known AIDS-related risks, including multiple partners and fishing (Barnett and Blaikie 1992), might not necessarily be the most decisive factors in 'the threshold of social immunity', with diverse livelihoods established as common practice along a continuum of income opportunity, labour availability, and cropping strategy.

Orphans, stigma and discrimination, assets and assistance

The respondents in the affected category took care of orphans, received assistance, and experienced discrimination. They had had to sell their assets or farm produce, or experienced property grabbing following the deaths of their family members. This confirms previous observations of AIDS impacts on rural households (Baylies 2002; Shah, Osborne et al. 2002; Drinkwater 2003; Hosegood, Preston-Whyte et al. 2007).

Although some respondents in the primary impact category commented on the important role of siblings and relatives, the sources of income and assistance were not limited to kin networks. Various forms of assistance came from other sources. This reliance on additional support could be taken to signal the limits of extended family networks as the major source of help (Mtika 2001).

Conclusion

This study explored responses to AIDS-related risks and coping strategies by households and individuals. Although some indicative shifts in risks and behaviour were observed, we did not find the significant patterns of family trees and cropping system changes that have been generally assumed for AIDS-affected households. Thus, the finding of our study suggests that the livelihood shocks by AIDS impact is one of the factors which affect families along a continuum of income opportunity, labour availability, and cropping strategy. More detailed study is required to understand alternative livelihood strategies in the face of multiple stresses.

4 Mobility mapping of AIDS-affected individuals in rice- and cassava-based farming systems in northern Malawi

Midori Yajima[18]

Abstract

The study explored personalised geographical mobility maps based on data extracted from in-depth life history narrations with 30 respondents in rice and cassava cropping areas in northern Malawi. The three selected locations in Karonga District were based on different livelihood compositions. Although the study area is in a resource-poor rural setting, there were some cash income sources: irrigated rice production at the Hara scheme, fishing in Lake Malawi, and small-scale trading. We estimated the level of AIDS impact for each respondent based on researcher-developed criteria. On the basis of the information gathered, respondents were allocated to those directly impacted, those indirectly affected, and those regarded as non-affected. The respondents' serostatus were not further verified. The geographical mobility data were analysed using Legacy software. It was observed that frequency of movement varied considerably between individuals and was not correlated with AIDS impact level, or with livelihood system or gender. One-third of all the respondents remained in the Chilumba area for the majority of their lives. Diverse reasons for migration were recognised, which were classified into six categories: guardian, education, income opportunities, marital reasons, divorce, and others. The unstable boundaries of 'community' and poverty-driven pluri-activity are possible explanations for the migration. Overall, the findings of the current study suggest that high mobility, a known AIDS-related risk, might not be the most decisive factor in terms of risk exposure to HIV. More detailed study is required to understand alternative livelihood strategies in the face of the multiple stresses identified.

Keywords: AIDS impact, Malawi, rural household, mobility, livelihood system

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[18] Submitted in October 2009

Introduction

The adult HIV prevalence in Malawi was estimated in 2007 to be 12% overall, 11% in rural areas and 16% in urban centres (Office of the President and Cabinet 2007). The loss of so many has aggravated food security, leading to increased diversity in livelihood strategies (Barnett, Tumushabe et al. 1995; Topouzis 1999; Baylies 2002; Shah, Osborne et al. 2002; de Waal and Whiteside 2003; Drinkwater 2003; Müller 2004). The situation challenges development programmes in all sectors, including smallholder food production as well as households themselves (de Waal and Tumushabe 2003).

The rural areas of Karonga District, in northern Malawi, where the study was conducted, experienced the earliest confirmative signs of AIDS and evidence of adverse socio-economic impact of 'the silent epidemic' (Iliffe 2006). Surveys conducted in 1999-2001 showed the female HIV prevalence in Karonga District to be 15% (Crampin, Glynn et al. 2003), when the estimated average figure for rural Malawi was 12% (Malawi National AIDS Commission 2003). The major causal factors for the higher prevalence are considered to be geographic proximity to the Tanzanian and Zambian borders and active migrant flow into and out of the area (Iliffe 2006). The more educated, traders, salaried employees, and casual labourers were among the first social categories affected, with infection also spreading gradually to local farmers (ibid). Migration is understood as one of the causal factors that increases the risks of HIV infection (Barnett and Blaikie 1992; Nguthi and Niehof 2008). At the time of the study, both voluntary counselling and testing (VCT) and antiretroviral therapy (ART) were becoming accessible in government clinics and mission hospitals within the locality (Makwiza, Nyirenda et al. 2006; Office of the President and Cabinet 2007).

The aim of the study is to understand the impact of AIDS on mobility at the individual level using cases from the Chilumba area in Karonga District. The particular focus is to map the geographic mobility of individuals in relation to the level of AIDS impact among rural communities with various degree of access to cash income opportunities in order to explore the role of AIDS in the web of opportunity and stress experienced by individuals and households.

Methods

Research setting and data collection

The study was conducted in the Chilumba area, from December 2005 to October 2008. The information is based on repeat (2-3 rounds) in-depth interviews (Patton 1980), 3 hours or more per each respondent, with 30 individuals in three locations (10 individuals in each location). The validity of such qualitative research with a limited number of respondents has been debated, but is rigorously grounded in the sciences (Reason and Rowan 1981) in ways that increase relevance, legitimacy and depth of meaning, an approach that can be especially powerful when complemented with evidence from larger scale or statistical approaches.

The locations were purposively selected, based on different livelihood systems:
(1) Mwandovi village: cassava as a subsistence crop, fishing for food and income;
(2) Kachere village: cassava as a subsistence crop, some rice and tobacco grown for cash income;
(3) Hara irrigation scheme: rice as a cash crop.

The *Tumbuka* are the dominant ethnic group in the study area, mixed with *Ngonde* from the North and *Ngoni* and *Chewa* from the Central and Southern Regions. The *Tumbuka* are known as practising high material transfers for their mutual support through their kinship system (Mtika 2003). The *Tumbuka* were matrilineal in the past, but because of influence of the *Ngoni*, they have changed to the patrilineal system (Tew 1950).

Fifteen respondents (5 from each location) were randomly selected to participate in semi-structured interviews (SSIs) concerning their perceptions of cassava pests and diseases (Chapter 2). An additional 15 respondents (5 from each location) were purposively identified based on reputation, based on observations by our local key informants (agricultural extension staff, secretary to farmers' groups, and deputy village head) of who they considered to be impacted by AIDS because of their health status, the sickness and deaths of close kin, or who were caring for orphans as a result. This process yielded a total of 30 respondents, 10 from each location. The level of AIDS impact for each respondent was later estimated (further explained in the Results section); health status was not further verified.

The data collection consisted of main narration (recorded with a digital audio recorder followed by translation and transcription), construction of life history chronologies, and drawing of family trees (Deshpande 2005). For respondents whose life history revealed a high degree of mobility or family dissolution, information on changes in residential location was elicited. Further analyses of livelihood systems, related to family tree structure and cropping system (Chapter 3), and life history narrations (Chapter 5), are reported separately.

All individuals identified by the informants agreed to be interviewed. Every effort was taken prior to and during the interviews to remove misinformation, expectation of benefit, or sense of stigmatisation. All respondents authorised recording of their responses. All identities in this paper are expressed in pseudonyms. All responses were given in the local language (*ChiTumbuka*) and written notes were maintained in English with the help of research assistants.

The family trees (N=30) were analysed using genealogical software, *Legacy* (version 7.0 Millenia 2008). With the supporting information from the narration and chronology, family trees were displayed as charts using *Legacy* (Chapter 3). Thereafter, mobility maps were drawn for selected respondents using the mapping functions of *Legacy*. The frequency and the reasons for the migration were analysed by Excel (Microsoft 2007) in order to examine the relationship between migration, gender, the AIDS impact levels, and livelihood systems identified by the study.

Results

Profile of respondents

The 30 respondents comprised 19 women and 11 men. Their ages varied from 27 to 80 years, with an average of 49 years. All respondents had married: 17 respondents were in monogamous marriages at the time of interview, 6 had been widowed, 5 were in polygynous marriages (involving 1-5 co-wives), and 2 had divorced (see Table 3-1). All respondents had attended school, ranging from 1 to 12 years, on average up to standard 7 in primary education.

Estimating the AIDS impact levels

The estimated levels of AIDS impact on each respondent were categorised based on the researcher's guideline explained below, attested by their self perceptions of

impact (Table 3-1-B). For the purpose of data analysis, three cases where the information conflicted (numbers 4, 14, 25 in Table 3-1, corresponding to 1/A; 2/B; 3/B in Table 3-2 respectively) were excluded, yielding a total of 27 respondents (Chapter 3).

Group 1 (no evident impact/'non-affected' with no perceived impact): 9 respondents (4 female, 5 male)
He or she reported that either they had had a blood test with negative results or did not report their serostatus, but had no known AIDS cases in their family trees.

Group 2 (primary level impact: assumed as 'people living with HIV/AIDS': PLWHA, impact perceived): 10 respondents (6 female, 4 male)
He or she reported that they had had positive results from the blood test or had known AIDS cases among their previous official partners (e.g., former spouses).

Group 3 (secondary level impact, impact perceived): 8 respondents (6 female, 2 male)
He or she did not report their own serostatus, but reported known AIDS cases in their family trees.

Diversity in income sources were observed for all impact categories, and included fishing and fish trading, remittances, small-scale businesses (bicycle taxi, grocery, carpentry, selling reed mats) and wages from employment (one respondent) or *ganyu* (casual hired labour) (Chapter 3). Sources of assistances, both in cash and in kind, were not limited to kin networks but included NGOs, churches, government, and community (Chapter 5).

Mobility in life: comparison between gender, location and three impact levels

The patterns of migration for all respondents were analysed in *Legacy* software. Respondents in the three locations (1)-(3) were categorised by gender and three impact levels in order to illustrate the relationship between mobility and livelihood system (based on location), gender, and impact level. Where there were more than two respondents in the same category, the one within or closer to the productive age group (15-49 years) were selected for comparison. The known locations they had migrated to in their lives to date were plotted using the mapping function of *Legacy* (Figures 4-1 to 4-3).

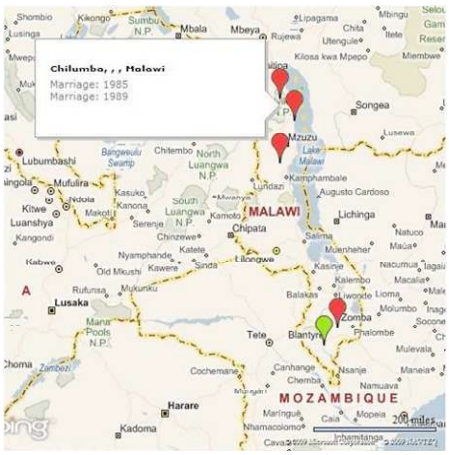
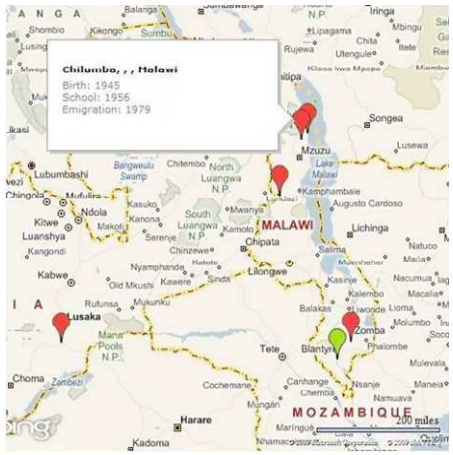
	Female	Male
Affected (primary)		
Affected (secondary)	N/A	
Non-affected		

Figure 4-1 Mobility maps by gender and impact levels: location (1) Mwandovi village
Drawn with Legacy (version 7.0 Millenia 2008)
Note: N/A means no respondent was allocated to the category.

Affected (primary)/ Female: 39 years, declared to be HIV positive, born, schooled and 2 marriages within Chilumba.

Affected (primary)/ Male: 37 years, declared to be HIV positive, born in Chitipa District, brought up in Karonga, emigrated for work to Monkey Bay, Chipoka, and Chilumba where he got married and settled.

Affected (secondary)/ Female: N/A

Affected (secondary)/ Male: 49 years, born in Harare, Zimbabwe, emigrated to Chilumba and Karonga for parental support, and again to Chilumba for schooling and later on to engage in fishing.

Non-affected/ Female: 51 years, born in Zomba, moved to Chilumba, travelled to Karonga for medical reasons, and received vocational trainings in Zomba, Mzuzu and Blantyre.

Non-affected/ Male: 64 years, moved within Chilumba and to Mzimba, Blantyre, following guardians changing schools. Worked in Blantyre and Lusaka then returned home to engage in fishing.

	Female	Male
Affected (primary)	N/A	
Affected (secondary)		N/A
Non-affected		

Figure 4-2 Mobility maps by gender and impact levels: location (2) Kachere village
Drawn with Legacy (version 7.0 Millenia 2008)
Note: N/A means no respondent was allocated to the category.

Affected (primary)/ Female: N/A

Affected (primary)/ Male: 43 years, declared to be HIV positive, born, schooled and married in Chilumba, engages in rice farming in the scheme and growing tobacco. Four marriages, two ended with divorce and one separation due to the death of the spouse.

Affected (secondary)/ Female: 37 years, born in Chilumba, and brought up and schooled in Lilongwe for 8 years, came back and got married in Chilumba. Also lived in Karonga for husband's work for 4 years.

Affected (secondary)/ Male: N/A

Non-affected/ Female: 32 years, born, schooled, married and had children in Chilumba, cassava farmer.

Non-affected/ Male: 27 years, born, schooled, married and had children in Chilumba, cassava farmer and runs bicycle taxi business.

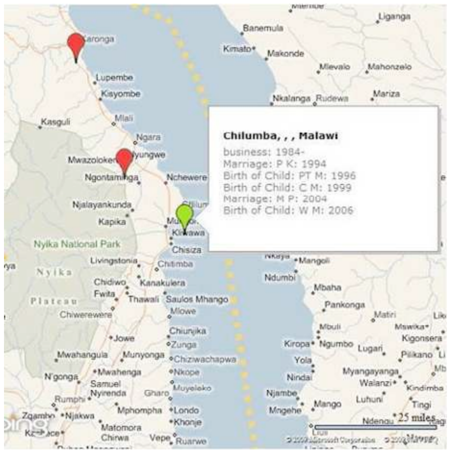
<table>
<tr><th></th><th>Female</th><th>Male</th></tr>
<tr><td>Affected (primary)</td><td>  </td><td>  </td></tr>
<tr><td>Affected (secondary)</td><td>  </td><td>  </td></tr>
<tr><td>Non-affected</td><td>  </td><td>  </td></tr>
</table>

Figure 4-3 Mobility maps by gender and impact levels: location (3) Hara scheme
Drawn with Legacy (version 7.0 Millenia 2008)
Note: N/A means no respondent was allocated to the category.

Affected (primary)/ Female: 33 years, declared to be HIV positive, travelled in search of piecework and later with her husband who passed away in 2007 due to a stomach problem (married only once)

Affected (primary)/ Male: 40 years, declared to be HIV positive, finished secondary education and started rice farming in the scheme, has piggery and local beer brewing business. He also has skills to maintain motorcycles. Three marriages, two ended with divorce.

Affected (secondary)/ Female: 51 years, born and brought up in several places in Tanzania, came back to Malawi for school. Two marriages, first one ended in divorce because of husband's violence. Has been cultivating rice in the scheme since 1979 with the second husband.

Affected (secondary)/ Male: 36 years born and stayed mostly in Chilumba, except for secondary school in Nkhata Bay. Did not complete secondary education due to lack of school fees, started rice farming. Active in AIDS community group and church. Lost half-sister's husband (brother-in-law) to AIDS. Father was in polygynous marriage with four wives, but he has one wife.

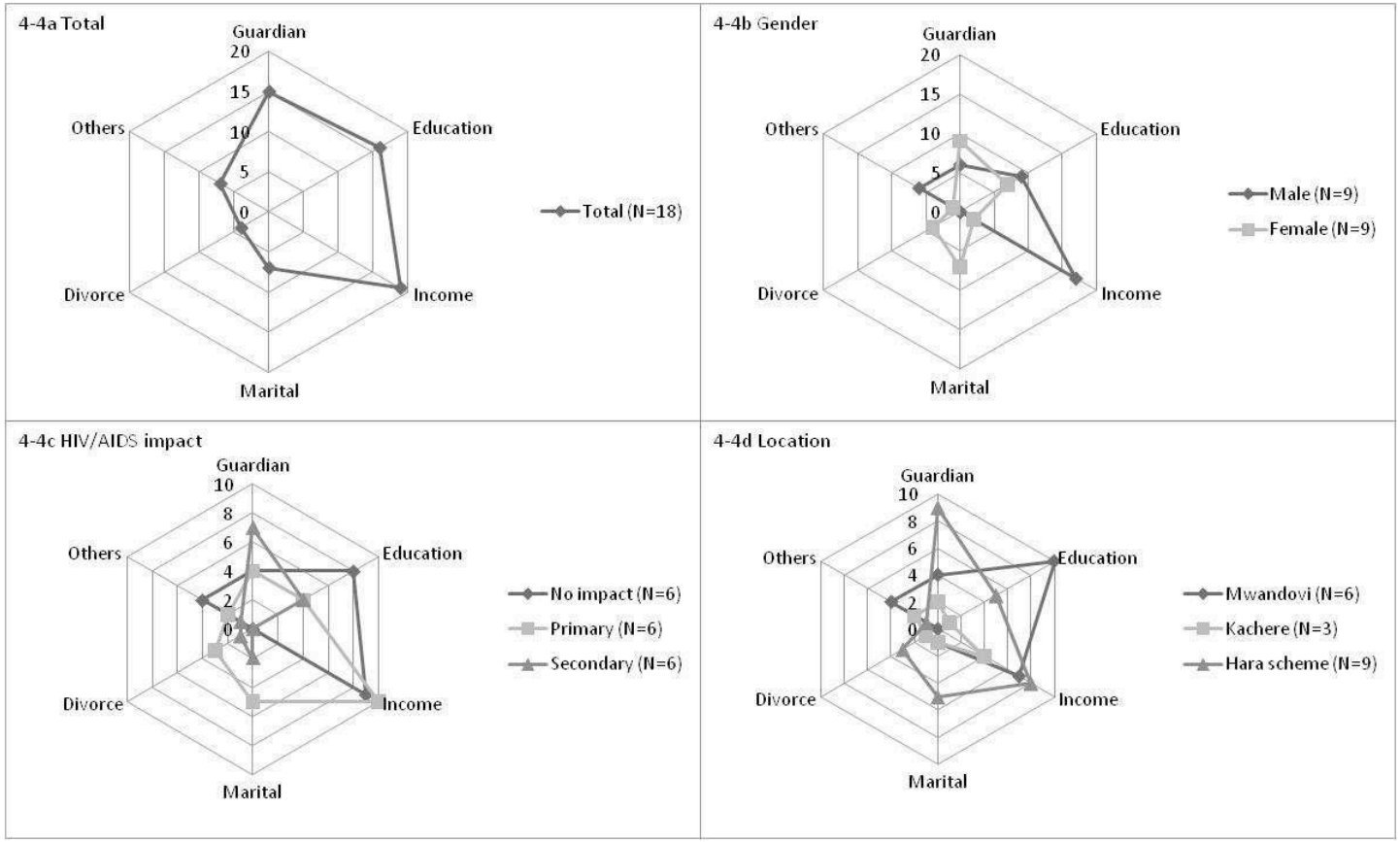
Non-affected/ Female: 36 years, declared to be HIV negative, born and started school in Zambia, moved to Malawi and continued schools but got pregnant and stopped whilst secondary education. Settled in the scheme. One marriage but faces shortages after the husband married a second wife, regrets not completing school which could have given her better income opportunities.

Non-affected/ Male: 49 years, born in Rumphi, schooled in Mzimba, worked in Mzuzu; travelled extensively within northern Malawi. One marriage. Employments (casual labourer, watchman), business (grocery, bicycle repair, selling second-hand clothes), progressive rice farmer (improved push-weeder).

The frequency of travel for the respondents who had ever migrated (N=18) varied between 1 and 7, with a mean of 5 times per person. Nine out of 27 respondents stayed in the Chilumba area for nearly all their lives. Eight out of the remaining 18 reported that they originated outside the district and came to Chilumba due to guardians' relocation (4), work (2), or marital reasons (2). It was observed that the migration of individuals varied considerably in terms of frequency and reasons (discussed in the next section).

Reasons for migration

The reasons given by the respondents for each migration episode fell into six categories: guardian, education, income opportunities, marital reasons, divorce, and other reasons. Movements related to 'guardian' included relocation due to a father's work or pension and living with relatives while parents were unable to take care of the respondents when they were young. 'Education' included relocation to enrol in formal (primary or secondary) schools and vocational trainings. 'Income opportunities' included employment, short- or long-term migrant labour, shift to irrigation scheme to work as rice growers, and migration to urban centres in search of income opportunities. 'Marital reasons' included relocation to join spouses on marriage and following the spouse because of transfers (in this research, this applied only to women following their husbands). 'Divorce' in this case refers to migration due to divorce and the death of the spouses (husbands). 'Others' included relocations for medical reasons, escaping from police, or coming home to retire. The narratives revealed that for any individual the reasons for migration over a lifetime were very diverse (Figure 4-4).



Figures 4-4 Reasons for migration (4-4a) with breakdown by gender (4-4b), impact levels (4-4c) and locations (4-4d) shown in aggregated frequencies

Note: In some cases, when there were more than one reason for one relocation (e.g., the father's job transfer as well as for education for children, or retire home due to divorce and for medical reasons, etc.), the reasons are counted in more than one category.

Analysis and discussion

Migration, mobility and livelihood opportunities

In Karonga, Glynn et al. (2001) reported travelling to be an important risk factor in the early stage of the AIDS epidemic. Our data captured highly varied causations for moving, although the data did not include routine, short-term, short-distance migration for seasonal employment or trading. Migration did not necessarily associate with AIDS impact level. In general, the desire to attain better livelihood opportunities was a key consideration for both men and women.

The mobility maps illustrate how two-thirds of the respondents, in nearly all classifications identified, have migrated outside the area of their origin at some point in their lives. The remaining one-third of the respondents, distributed across all three locations, remained in the Chilumba area for the most part of their lives. This suggests that conceptualisation of a 'community' and 'social life' as a rather stable, bounded social existence needs to be questioned. Likewise, conceptual categories such a 'family networks' seem no longer appropriate to describe the somewhat opportunistic way in which 'social ties' are formed and dissolve in the context of high mobility, high risks of uncertain livelihoods, illness, and mortality from AIDS.

Migration for guardians

No respondent in our study reported being double-orphaned (i.e., had lost both parents) when young. The life histories suggested that sponsorship for reasons of schooling or parents' economic reasons were the main motivations for migrations at early ages, rather than parental loss. Respondents in the secondary impact category group and from the Hara scheme showed a higher mobility rate for reasons related to guardians compared to other categories. This might imply problems with childcare for these categories due to labour demands. Also, 88% (21/27; 15/18 of those who are affected – 8/10 in primary category and 7/8 in secondary, 6/9 of those who are non-affected) (Chapter 3) respondents reported they had or currently were fostering orphans. This suggests that the number of orphans has increased in the locality over time, signifying the long-term, gradual impact of the epidemic (Barnett and Blaikie 1992; Baylies 2002).

Migration for education

In the Northern Region of Malawi, the net enrolment ratio of children attending primary schools was at 87% in 2005, higher than the Central and Southern Regions, at 80% and 78%, respectively (National Statistical Office of Malawi 2005). The patrilineal system is considered to encourage primary enrolment.[19] It could be interpreted that migration is positively related to primary enrolment. It was, however, observed that the southern part of Karonga, including Chilumba, has a high dropout rate, reportedly because of higher exposure to cash income opportunities such as selling rice or fish and trading with Tanzanians.[20] In our study, the respondents in the 'no impact' group and those in Mwandovi village showed a higher rate of mobility for education than the other categories. This might be related to a higher economic stability of these groups, possibly either through existing family support for the former or relatively reliable income from remittances and fishing for the latter. One respondent (no impact, male) was brought up by a single parent and another (secondary impact, male) experienced the serious illness of one of his parents, resulting in lack of parental support for both respondents that in turn affected their education and was given as a main reason for dropping out of school. The study also indicated a high frequency of migration for educational purposes such as enrolment and transfer and that children's schooling was highly valued during the life history narration (Chapter 5).

Employment and income opportunities

Rural-urban migration (for example, going to Mzuzu city from Chilumba) in search of better income opportunities was observed mainly, but not exclusively, by the male respondents. Hence, the low mobility rate of the secondary impact group could be due to the fact that the group included 75% (6/8) female respondents. Even though some of these attempts to search opportunities were not successful, urban areas were perceived as offering wider and better income possibilities. However, employment does not always provide sufficient income for upkeep in the setting of Malawi. One respondent (affected-secondary/female) commented that farming at the rice scheme provides more stable income than government work for a low salary. Yet, even though

[19] Research note by author, 11 February 2007, Chilumba.

[20] Interview by author with primary education advisor (PEA), personal communication, 11 September 2008, Chilumba.

the irrigated rice scheme offers reasonably secure income, men and women were migrating to gather the cash to meet financial demands for survival, such as children's school fees.

Marital reasons and divorces

The fluidity of marriages in Africa has been discussed in the context of HIV/AIDS (Kaler 2001; Reniers 2003) and higher divorce rates have been reported in the case of Malawi. The primary group and Hara scheme showed higher mobility rate for marital reasons and divorce, indicating less stability in marriages compared to those in other categories. Marriage and divorce may be used as tools for minimising risks but are also regarded as a factor that increases risk exposure. Polygyny, divorce, remarriage, and multiple partnerships, all involving migration predominantly by women, were recorded in this study. It was also observed that labour migration in some instances had led to marriage dissolution, as noted in other studies in Malawi (Reniers 2003).

Off-farm activities in search of better livelihood

As already observed in other studies in Malawi (Bryceson 2003), small-scale farmers throughout the world have resorted to 'pluri-activity' as a common response to pressures on farm incomes (McIntyre, Herren et al. 2009). Policymakers have variously responded to this situation. Some programmes have tried to discourage pluri-activity by developing the 'core farm business' of small-scale producers by developing their entrepreneurial, managerial, and technical capacity to become full-time farmers engaging with competitive markets. Others have sought to boost pluri-activity as a way to revitalise rural areas by diversification of economic opportunity. Even though the cooperatives and rice mills in Hara Rice Scheme could be regarded as an example of the former, our result at the same time suggests that the scheme's farmers resort to migration either to access education and additional income opportunities or for social reasons (such as guardian, marriage and divorce). On the other hand, development assistance and other support organisations in Karonga have made few investments in the development and modernisation of off-farm economic activities as of yet. Thus, pluri-activity remains a matter of individual survival and a livelihood-seeking strategy rather than a defined development 'pathway out of poverty'.

Conclusion

Overall, the findings of the current study suggest that neither the frequency nor the distance of migration stand out as decisive factors in the level of impact in our study. These indications suggest that (1) the risks of contracting HIV faced by non-migrating population should not be underestimated, and (2) high mobility as one of the known AIDS-related risks might not be the most dominant factor in terms of AIDS impact, because individuals put together diverse livelihoods along a continuum of income opportunity and labour availability, and some of these are risk-free.

5 Life history analysis of AIDS-affected households in rice- and cassava-based farming communities in northern Malawi

Midori Yajima, Arnold van Huis, Janice. L.S. Jiggins[21]

Abstract

AIDS threatens the development of countries in parts of Sub-Saharan Africa, including Malawi. The magnitude of the epidemic has had considerable socioeconomic impact on rural livelihoods. The 'New Variant Famine' hypothesis proposed that AIDS poses a major challenge to food security in this part of Africa by impairing the functioning of traditional support systems, leading to the collapse of 'social immunity'. This study explores the changing perceptions of AIDS and peoples' responses to its impact by eliciting life history narratives of 30 respondents in northern Malawi. The respondents were classified by means of three variables: gender, livelihood systems, and AIDS impact levels. In the life histories, respondents reported a range of critical events that threatened their social immunity, including deaths, sicknesses, migration, marriages and divorces, and dropping out of school; i.e., a greater range of risks than AIDS alone, and these need to be recognised in AIDS programmes. For the respondents who were classified as AIDS 'affected', learning about their seropositive status was found to be an important, and in some cases a positive, turning point in their lives in terms of behavioural changes, such as joining support groups and opening up to discussion of the implications of their status. This could suggest a second lesson for public health: the strengthening of social, organisational and personal capacities for such individuals, together with an increased access to health services, may confer a higher level of social immunity.

Keywords: Malawi, AIDS, impact level, rural households, life history

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[21] *Submitted in August 2009*

Introduction

AIDS is the leading cause of death in the productive age group 15-49 years in Malawi (Malawi National AIDS Commission 2003). The adult HIV prevalence was estimated in 2007 to be 12% overall, 11% in rural areas and 16% in urban centres (Office of the President and Cabinet 2007) with the state of generalised epidemic (U.S. Census Bureau 2000). The effects have adversely impacted agricultural production, impairing food and nutrition security (Barnett, Tumushabe et al. 1995; Topouzis 1999; Baylies 2002; Shah, Osborne et al. 2002; de Waal and Whiteside 2003; Müller 2004).

The 'New Variant Famine' hypothesis (de Waal and Whiteside 2003; Arrehag, de Waal et al. 2006) argues that the AIDS epidemic is a major contributing factor in recurrent food insecurity in southern Africa. The hypothesis identified four causal factors: labour shortage, asset and skill loss, increasing burden of care for the sick and orphans, and malnutrition, leading to the erosion of assets and skills (de Waal and Whiteside 2003). The situation is regarded as offering an exceptional challenge for food security and overall welfare of the affected (de Waal and Tumushabe 2003; de Waal and Whiteside 2003; Arrehag, de Waal et al. 2006; Chapter 3).

There is a well-documented concern about a break in agricultural knowledge transmission from adults (deceased parents) to children (orphans) in AIDS-affected communities (Fagbemissi and Price 2008). Using a language-based ethnobiological approach, freelisting elicitation of pests in maize in Benin, involving 45 orphans, 15 non-orphan children and 30 adults, allowed the construction and analysis of a Cognitive Salience Index score (ibid.: 254-256):

- Orphan children were more knowledgeable than non-orphans.
- One-parent orphans residing with a surviving parent were more knowledgeable than double orphans (both parents deceased) farming on their own.
- Non-affected adults and their children scored significantly lower than AIDS-affected adults and children.

In Malawi, many small-scale farmers depend on income from *ganyu* (casual hired labour) as a way to bridge the seasonal food gap. Hence, AIDS-affected households have tended to neglect their own gardens, creating a so-called 'downward spiral' (Bryceson 2003; Drinkwater 2003; Chapter 3). Confirmative evidence of such phenomena have been reported (Robson, Ansell et al. 2007). Changes in and death of

spouses and displacement of orphaned children, leading to labour exploitation and trafficking (Drinkwater 2003), accelerates the erosion of small-scale farming communities' economic competence and traditional social unity.

The concept of 'social immunity' is defined as the 'ability of a collective of people, specifically the extended family, to mitigate the impact of an affliction' (Mtika 2001). The concept indicates that, when a household is struck by AIDS, it first receives assistance from the immediate and extended family members, but when the gravity increases until it reaches the threshold level, the traditional support system becomes depleted (Mtika 2001; Beraho 2008).

The objective of this study is first to understand the impact of AIDS at the individual level, based in three livelihood systems, which are experiencing different levels of AIDS-related impacts. By eliciting life history narratives, the study explores people's responses to the impact and changing perceptions of AIDS-related issues. The findings are examined in light of the 'New Variant Famine' hypothesis and the 'threshold of social immunity' in order to draw implications for public health programming. Since the first cases of AIDS were reported in the 1980s in Malawi, as of 2009 the respondents had lived through the transitional period: before and after the onset and the growing public and private acknowledgement of the epidemic.

Methods

Research setting

The study was conducted in Chilumba (Karonga District, northern Malawi) from April 2007 to October 2008. Surveys conducted in 1999-2001 showed the female HIV prevalence in Karonga District to be 15% (Crampin, Glynn et al. 2003), while the estimated figure for rural Malawi was 12% (Malawi National AIDS Commission 2003). Geographic proximity to the Tanzanian and Zambian borders and active migrant flow into and out of the district are thought to be additional causal factors affecting initially the more educated, traders, salaried employees, and casual labourers (Iliffe 2006). The Uliwa trading centre, located some 140 kilometres north of Mzuzu city and 70 kilometres south of Karonga *boma* (district centre), is the second-largest township after Ekwendeni along the 'northern corridor', offering a convenient stopover point for seasonal traders and long-distance truck drivers. At Chilumba Jetty, some 11 kilometres distance from Uliwa, steamer lines make a weekly stop on their way to and

from Tanzania and southern Malawi (see Figure 1-5). The *Tumbuka* are the dominant ethnic group in the area, mixed with *Ngonde* from the North and *Ngoni* and *Chewa* from the Central and Southern Regions.

At the time of the research, services for voluntary counselling and testing (VCT) and antiretroviral therapy (ART) were becoming accessible. Between 2005 and June 2007, ART coverage increased three-fold: from 38,000 to 114,000 (Office of the President and Cabinet 2007). In 2006, 21% of those with advanced HIV infections had access to ART (World Health Organization 2008).

Sampling strategy

The respondents were purposively selected from three locations with different livelihood systems (Figure 1-5):
(1) Mwandovi village: cassava as a subsistence crop, fishing for food and income;
(2) Kachere village: cassava and maize as subsistence crops, some grow rice and tobacco for cash income;
(3) Hara Irrigation Scheme: rice as a cash crop, supplemented by cassava and maize.

Ten respondents from each location (N=30) were selected, using a combination of random sampling and reputational sampling (Chapter 3); i.e., 15 of the respondents had participated in a related study on their agricultural practices and 15 were recruited through referral by local key informants, who had been asked to identify those whom they thought might be experiencing particular hardships due to their health status or the sickness and deaths of their close kin, or who were looking after orphans as a result.

Data collection

The main information presented here is based on repeat (2-3 rounds) interviews with 30 individuals in three locations (10 in each location, Figure 1-5). Research assistants were trained in active listening techniques in order to encourage in-depth discussion of sensitive and confidential issues.

The data comprise a main narration based on in-depth interviews (of 3 hours or more per respondent), recorded using a digital audio recorder, followed by translation and transcription, construction of life history chronologies, and drawing of family trees

(Chapter 3). The chronologies were used to verify the information in the narration on the second visit. This was followed by a semi-structured interview focusing on AIDS (Deshpande 2005). Responses were recorded in the local language (*ChiTumbuka*); written notes were maintained in English with the help of research assistants. All respondents authorised recording of their responses. All identities in this paper are expressed in pseudonyms.

Assessing the impact levels

We developed the following guidelines in order to estimate the level of AIDS impact among our respondents (Chapter 3).

Group A (primary impact level): Respondents reported that they had positive results from the blood test or their current or previous partners were known AIDS cases.

Group B (secondary impact level):
Respondents did not report their own serostatus, but reported known AIDS cases in their family trees.

Group C (no evident impact):
Respondents reported that either they had had a blood test with negative results or did not report their serostatus, but had no known AIDS cases in their family trees.

Data analysis

All narrations (N=30) were coded using qualitative analysis software (Atlas.Ti, version 5.0, Scientific Software Development 2004). The frequencies of codes were exported and analysed using SPSS (version 16.0, SPSS 2007) and Excel (Microsoft 2007). Follow-up interviews were analysed in Excel. Analysis of individual life histories followed standard biographic narrative procedures (Deshpande 2005).

Categorising codes into conceptual clusters

The concepts recorded in the narratives were coded with the help of Atlas.Ti software. Thereafter, each code was categorised into five conceptual clusters: family structure, health problems, risk exposure, shortages/hardships and social organisation/capital (Table 5-1).

The clustering of codes was based on the life history narrations, personal communication with local informants, and field observation. During the clustering process, it was noted that some codes could be allocated to more than one category. For example, 'death' concerns family structure, but also could be included under health problems, hardships, and risk exposure. Likewise, 'advice' could either be bad, which could be allocated to risk exposure, or good, which could be counted as social capital. The distinctions were sometimes obvious from the context, but this was not always the case. Under these circumstances, the codes were allocated in all possible categories; hence one code could be counted more than once.

Table 5-1 Conceptual clustering of codes cited during the life history narrations

Conceptual clusters [1)]	Codes [2)]
Family structure: 28 codes	children(205) death(149) marrying(118) mother(118) husband(98) father(89) siblings(44) brother(32) co-wives(32) parents(32) relatives(31) childcare(23) divorce(22) sister(21) wife(19) unplanned pregnancy(17) orphans(15) stepchildren(12) grandchildren(9) stepmother(8) child fosterage(7) grandparents(7) guardians(6) partnership(6) uncle(6) polylgyny(5) family planning(1) stepfather(1)
Health problems: 18 codes	death(149) health problem(79) HIV/AIDS(25) hospital(17) herbalist(15) serostatus(15) caring the sick(14) mental problem(13) VCT(11) ART(10) medication(10) nutrition(8) doctor(5) frequent illness(5) malaria(4) TB(3) HBC(3) weight loss(1)
Risk exposure: 29 codes	death(149) money(142) travelling(115) employment(73) stop school(59) business(58) advice(31) divorce(22) conflict(21) 'bad' behaviour(20) unplanned pregnancy(17) violence(16) teacher(16) orphans(15) illicit behaviour(14) police(7) poverty(7) imprisonment(6) unfaithfulness(6) witchcraft(6) military(5) arrest(5) sex for money(3) beer brewing(3) forging IDs(3) dancing in band(2) drought(2) attacking teachers(1) partnership dissolved(1)
Shortages/ hardships: 20 codes	death(149) money(142) hardship(63) stop school(59) food(36) domestic work (22) conflict(15) clothes(15) caring for the sick(14) accident(11) house(8) hunger(8) nutrition(8) poverty(7) dowry(6) discrimination(3) funeral(3) labour loss(3) drought(2) stigma(2)
Social organisation/ capital: 33 codes	school(152) farming(85) assistance(73) employment(73) business(58) church(45) relatives(31) AIDS support group(22) vocational training(20) sports(18) CBO(17) government(17) hobby(16) FFS(12) VCT(11) friends(8) farmers club(7) volunteer work(7) fishing(6) guardians(6) partnership(6) leadership(6) political party(5) choir(5) advice(31) assets(3) HBC(3) Malawi young pioneers(3) scheme committee(3) water(2) ethnic group(1) traditional dance(2) beer brewing(3)

1) Clustering was based on interpretation of life history narrations, personal communication with local informants, and observation

2) In the order of frequencies (in brackets)

Notes:

CBO: community-based organisation; FFS: Farmer Field Schools; HBC: home-based care; VCT: voluntary counselling and testing

Results

Respondents' profile

The 30 respondents comprised 19 women and 11 men, ranging from 27 to 80 years, with an average of 49 years. All respondents had married: 17 respondents were in monogamous marriages at the time of interview, 6 had been widowed, 5 were in polygynous marriages (involving 1-5 co-wives), and 2 had divorced. All respondents had attended school, ranging from 1 to 12 years, on average to standard 7 in primary education.

AIDS impact levels

Based on our pre-set guidelines (Chapter 3), we allocated the 30 respondents to three levels of AIDS impacts: primary level, secondary level, and no evident impact (non-affected). Their impact level, locations, gender, and livelihood systems are given in Table 5-2.

Table 5-2 Respondents' categorisation by location and impact levels

	A- primary level 11 respondents		B- secondary level 9 respondents		C- no evident impact (non-affected) 10 respondents	
	Female: 7	Male: 4	Female: 7	Male: 2	Female: 5	Male: 5
(1) Mwandovi village	4	1	0	1	2	2
(2) Kachere village	0	2	5	0	2	1
(3) Hara Irrigation Scheme	3	1	2	1	1	2

Notes:
(1) Mwandovi Village: cassava as a subsistence crop, fishing for food and income
(2) Kachere Village: cassava as a subsistence crop, some grow rice and tobacco for cash income
(3) Hara Irrigation Scheme: based on cash income from rice production
A (primary level): He or she reported that they had had positive results from the blood test or their previous partners or their former spouses were known AIDS cases. Assumed as 'people living with HIV/AIDS': PLWHA
B (secondary level): He or she did not report their own serostatus, but reported known AIDS cases in their family trees.
C (no evident impact): He or she reported that either they had had a blood test with negative results or did not report their serostatus, but had no known AIDS cases in their family trees.

The data were used to provisionally assess the 'impact level' of the respondents, namely the self-reported serostatus. AIDS deaths within the family and relatives, could not be objectively verified, and self-reporting cannot be assumed a priori to be either accurate or complete, particularly when there is strong stigma and discrimination.

Therefore, the information presented here inevitably carries some degree of uncertainty and ambiguity.

Frequently cited concepts in the narrations

In total, there were 113 unique concepts recorded as codes during the analysis of the life histories by Atlas.Ti software, with citation frequencies ranging from 205 to 1 (Table 1). 'Children' was the most frequently cited, followed in descending order by, 'school', 'death', 'money', 'marrying', 'travelling', 'husband', 'father', 'farming', and 'health problem'. The conceptual cluster with the highest frequency was 'family structure' (1,066 times), followed by 'risk exposure' (825), 'social organisation/ capital' (778), 'shortages/ hardships' (583), and 'health problems' (387).

Narrative extracts by impact levels

In order to illustrate the respondents' perceptions of AIDS-related concepts in the context of their life histories, excerpts from respondents' narrations in each of the three impact levels in the different locations are presented below.

Primary impact

'Uhule': translated as a "sexual immorality culture" (Mtika 2000; Kaler 2001)

Respondent 1: Category A-3 (Female, 44 years, married in polygyny)

Respondent 1: We haven't ever gone to bars. It is only that we don't have good marriages.

Interviewer: What did you mean? Can you explain?

Respondent 1: Some parents say, when you go out and come home late they think that you were with men. So they don't like it... Going to church is allowed. Because they don't want us to go anywhere without their knowledge...

Interviewer: Do you have something to add, or can you tell me any difference between Malawi and Zambia?

Respondent 1: For me, my brother [emphasis], I have only seen the difference in costs of knitting materials. Because in Zambia there was good amount of money fetched by knitting. But as for here, in Malawi, it is also better because you find money in good way other than going out with other men [*uhule*] to find money. As to where I

got married, my husband was coming from a very poor family. But he was so promiscuous [*uhule*].

Opening up to the challenges, developing collective coping mechanisms

Respondent 2: Category A-3 (Female, 57 years, widowed)

Interviewer: Can you tell me what prompted you to join these groups like home-based care and NAPHAM [The National Association of People Living with HIV and AIDS in Malawi; Malawian NGO to support people affected by HIV/AIDS in Malawi]?

Respondent 2: Home-based care, I joined because of how I am. I am alone, and I don't have a husband. And I have also problems with my friends whom I know that they are like me. We thought of coming together to assist each other with the same problems. We contributed *kondowole* [fermented cassava flour; staple food in the region] and visit those who are cared at home. We sometimes buy soaps and give them to those people with the same problems. Those who are bedridden, we bathe them and wash their clothes.

Interviewer: m-huh.

Respondent 2: Yes. If they are severely ill, we take them on our back to the hospital for admission...[pause]

Interviewer: Ok. Continue, mother.

Respondent 2: [clears throat] Should I continue? As for NAPHAM, I joined NAPHAM because I was tested positive. And I started receiving ART therapy. So I was advised to join NAPHAM.

Interviewer: Ok.

Respondent 2: The importance of joining NAPHAM is that there is help. They sometimes give us money for transport and send us eggs.

Interviewer: Hum.

Respondent 2: They also teach us to have gardens where we grow vegetables [clearing throat] maize and, when we harvest these, we sell and also eat some by ourselves.

Interviewer: M-huh. Are you assisted in the way you have said?

Respondent 2: Yes [emphasis].

Interviewer: Ok. Continue.

Respondent 2: Even when I grow cassava, I also sell the roots – that helps me buying soaps and relish...

Interviewer: What help has ever come to HBC [Home-based care]?

Respondent 2: No, we haven't received anything. But it is our own initiative.

Risks associated with income and resources

Respondent 3: Category A-2 (Male, 42 years, married in monogamy)

Interviewer: So, what do you think of doing in the future?

Respondent 3: What I can do now is like I think of keeping stocks and doing well in farming. As my wife passed away [of AIDS], I need to stay mindful of myself, of which I can do better if I do farming, so I take good care of my wife. But the problem is that according to village life, to acquire fertilizer and seeds, is problem. Thus if these materials are a problem, farming is a problem too. Because money is not easily found in villages. If you hunt for money through various activities, you won't become stable… As a result, you are also not sure of having a stable source of money.

Affirming life in the face of discrimination: having children, staying healthy with support

Respondent 4: Category A-1 (Female, 39 years, married in polygyny)

Respondent 4: I have known my serostatus since 2000. And as I was tested, when you have known your serostatus, it helps that you change your behaviour and the worries go away because you know how you are. I am now very fine. But in the village here, some people say that we are positive and we cannot work. And when there is any assistance given in this village, we are excluded. But we all need to have coupons for buying fertilizer. When there are things that are distributed free, we were told that you are sick, you cannot work. You asked me how I cultivate cassava; I said I cultivate cassava because I want to make business. I do business because I want to look after my children. The big thing is that there is discrimination in the village.

Interviewer: When did you come to know your serostatus?

Respondent 4: In 2000. And I joined NAPHAM in 2003 and I am now 4 years with NAPHAM. I learn more from NAPHAM now, what we are supposed to do to stay healthy. That is why I have not started receiving ART up to this time. Because I learn how to stay healthy the rest of my life. And I gave birth to my last born in 2006 when I was already with NAPHAM. And when I got pregnant, I did not stay together with my husband. To avoid reducing my body [strength]. We are told to use 'papers'. As I was staying away from my husband, that is why I have not been sick.

Interviewer: What do you mean by 'paper'?

Respondent 4: [laughs] There is our grandmother, I cannot disclose this. But I mean *chishango* ['shield' in the local language *ChiChewa*; a brand name for condom]. We are told that when you are positive and pregnant, you should not continue sleeping with men, to protect your body… I may advise my friends who have not yet gone for testing that they should do so, to know their serostatus. Because now we have the medicine of ART, and when you are sick, and you tell the doctor that you are HIV positive, you are given the medication pertaining to your status.

Respondent 5: Category A-1 (Male, 36 years, married in monogamy)

Respondent 5: Can I explain how I am?

Interviewer: Yes.

Respondent 5: Me, I am mm, [pause] I was found that, in 2004, mmm, I went to Karonga [District] Hospital and was tested. And I was found that I am HIV positive. [low voice, pause] When I was tested, I received the results and was counselled, and though I cultivate, I get assistance from the government through ARTs. And they give me power to cultivate. They are very good drugs. The problem is money. Those assistances from government, I mean the money I receive, is not enough to buy fertilizer to cultivate in the garden. And the money cannot accomplish all that we want when you want to cultivate a big farm... It doesn't fulfil our needs. [long pause] Shall we continue?

Interviewer: Yes.

Respondent 5: Now at this time, I feel very fine. I don't have any problem. [pause] I say I don't find any problem because the government helps me to find money.

Secondary impact

Frequent deaths in the family as a risk, and food security concerns

Respondent 6: Category B-2 (Female, 70 years, married in monogamy)

Respondent 6: My brother's death is the one that troubled me much, because we nursed him much and moved him here and there. I mean, Blantyre. My young sister, not so much. She only suffered one morning and she died in the afternoon. And that [the death of a younger brother] was also a problem because of swollen stomach when he was given an injection. At the point of injection, yellow water came out of his body [implying, they knew that this was abnormal]. It took a year from the time he started suffering this problem to the time he died. The other one died young and she was a twin.

Interviewer: Was this a boy or girl?

Respondent 6: Girl. Because of these deaths, I am really worried. I find food myself and cultivate and find food for ourselves.

Hopelessness, striving for survival

Respondent 7: Category B-2 (Female, 37 years, widowed)

Respondent 7: My husband passed away in 2005. He left with me 6 children.

Interviewer: Ok.

Respondent 7: But I have not gone back home. I am still at the village of my late husband taking care of 6 children. I have got no support. I assist myself. I cultivate with my children. I grow rice, cassava, maize, and sweet potatoes. To do this, I have lots of problems in growing this. But because I am a human being, I still have to assist myself. [pause, noise] I also cook *vithumbuwa* [fried cakes] and sell at the school. And at times I also sell fish. At times I also buy cassava at wholesale and sell. Because I try my best to assist myself. [pause] I don't want to depend on anybody else. [long pause] ... I don't have relatives

from my husband's side. To me I am finished. No any word to add. I am purely a poor person. [long pause]

Activity regarded as 'risky'

Respondent 8: Category B-3 (Female, 51 years, married in monogamy)

Respondent 8: Here at my family, we live a good life, we don't have any problem like sickness, as of now, I haven't had any problems of either being sick or admitted. Maybe these will come in the future. I thank god on that, because I am ok…

Interviewer: You talked about your band at school.

Respondent 8: Oh, you say band. [laughs]

Interviewer: Didn't you think of improving this talent, of being in a band?

Respondent 8: This was a very important thing. And we even see our fellow friends who are doing band activities. And this reminds us what we were doing at school. But we know for sure that this leads everyone, who is involved in these things, to have girlfriends or boyfriends, hence, you die quickly. As of now, those friends who had these talents, we count that they are dead. I thank God for not improving me on this talent, but on farming.

Spontaneous involvement in CBO (community-based organisation)

Respondent 9: Category B-3 (Male, 36 years, married in monogamy)

Respondent 9: What prompted us was to fulfil the desires of the community, as it was discovered that many people are dying each year here. There was an increase in the number of orphans, and there was discrimination against those people who were known to be positive. And people were saying that they cannot stay together with those who were found positive, in fear of being infected. So this came to my mind that these people who are discriminated against are also people like us. Why don't we start a group which addresses these issues in the community? So we thought of how best we can group together to solve this problem. This is when we thought of starting this CBO.

Interviewer: M-huh.

Respondent 9: Later on, we thought of coming together and making the programme for visiting the home-based people, the orphans, and other vulnerable groups. We were also sitting together to share experiences and knowledge of how best we can be assisting each other.

No evident impact

Livelihood shocks, impact on support system

Respondent 10: Category C-3 (Female, 35 years, married in polygyny)

Interviewer: Is there a time when you have been unhappy after marriage?

Respondent 10: Yes, the time my husband married a co-wife.

Interviewer: What actually worried you most?

Respondent 10: [Since] the time he was getting married to this other wife, I have had no peace of mind and comfort with the family. I only stay in the family simply because I feel good to be in family life [[22]]… the time I was alone without the co-wife, he supported me well, but all suddenly changed with the marrying to his second wife.

Interviewer: So what are the actual problems you face in marriage these days?

Respondent 10: I am doing almost everything alone. Things like cultivating, taking care of children, feeding them, clothing them alone. I remember the deaths of my father, my elder sister, and younger sisters. All these passed away and I was deeply touched by their deaths. I am mainly worried to lose my elder sister who is already old. [low voice, unclear]

Interviewer: How do you look at your life before and after the deaths of these relatives?

Respondent 10: The life was good before the deaths of these relatives. For instance, the sister of mine who was in Zambia used to send me gifts from Zambia and bring gifts when she is visiting home. And she was

[22] The research team interpreted what she means by 'it is good to be in family life' as meaning it is socially and culturally respected to be in a family. For instance, sometimes people could assume single women survive through sex work (*uhule*) because they stay alone and men would constantly approach them for an affair.

also sending us whatever we asked her to send us when she was in Zambia. But as of now, even if we suffer, there's nobody to ask for assistance. That is the difference.

Interviewer: So, how is your today's life? Especially, how you find day-to-day food?

Respondent 10: We search for food. Mainly through farming rice, maize, and cassava.

Interviewer: Is the food you cultivate enough for you?

Respondent 10: On the crops we cultivate, we rely much on cassava for food. The maize does not last long. Rather, cassava. And rice, it's mainly grown as a cash crop.

New terminologies related to HIV/AIDS

The use of new, euphemistic expressions was observed in the life histories. AIDS was implied for instance by the following: '*Matenda gha sono*' (current disease), '*Matenda gha boma*' (government disease), '*Akulwala kanthukala*' (he/she is suffering from 'that thing'), '*Alikutola kanthukala*' (he/she has contracted 'that thing'). The research assistants in each case sought to clarify the exact meanings. For example, 'government disease' is used to indicate that HIV/AIDS is prevalent in every corner of the country – in all districts, sectors, and levels – similar to the government structure.[23]

Critical events in the search for livelihood

For all respondents, the death of spouses, guardians (including parents), and close-kin (siblings, children) were expressed as critical events. Migration, marriage, and divorce (including acquiring co-wives by polygynous husbands), dropping out of school (due to lack of money to pay fees, unplanned pregnancy, violence at school, etc.), and their own sickness or that of family members were also important events. It was observed that respondents in the secondary and the non-affected category tended to show stronger fear and concern about their risks as compared to those in the primary category, who sometimes seemed to have become empowered through knowing their status and sharing knowledge and experiences in support organisations.

[23] Manzunda, R.B., interview by author. 15/09/2008, Chilumba.

For the 'affected' respondents in the primary category, learning about their own seropositive status was identified as a major turning point in their life history, leading to behavioural changes (e.g., selective use of condoms) and taking part in support organisations. However, overall decisions concerning family planning remained unchanged for the six (out of 11) respondents in the primary category. Of the other five, three were widows, one was not married but had a distant partner, and, in the fifth case, the husband was staying with a second wife in a distant town, as the respondent was considering a divorce. In other words, all respondents with primary impact who are in formal marriages are choosing to continue having children after knowing their serostatus. Some are receiving various forms of assistance from support organisations and government, such as money or advice on nutrition and sexual practices. In the follow-up interviews, all the respondents in the primary category said that they would not take the children out of school to help with the farm work, commenting that this would disturb the children's future.

Analysis

Analysis of conceptual clusters

The findings from the Atlas.Ti analysis were examined for the three variables of gender, livelihood systems and impact levels, as shown in Figure 5-1.

Only 'Social organisation/capital' in Kachere village (Figure 5-1b) scored significantly low compared to the other two locations ($p \leq 0.05$). No other variable showed weak significance ($0.05 \leq P \leq 0.1$). The frequency of conceptual clusters recorded during the narrations associated neither with gender nor impact levels.

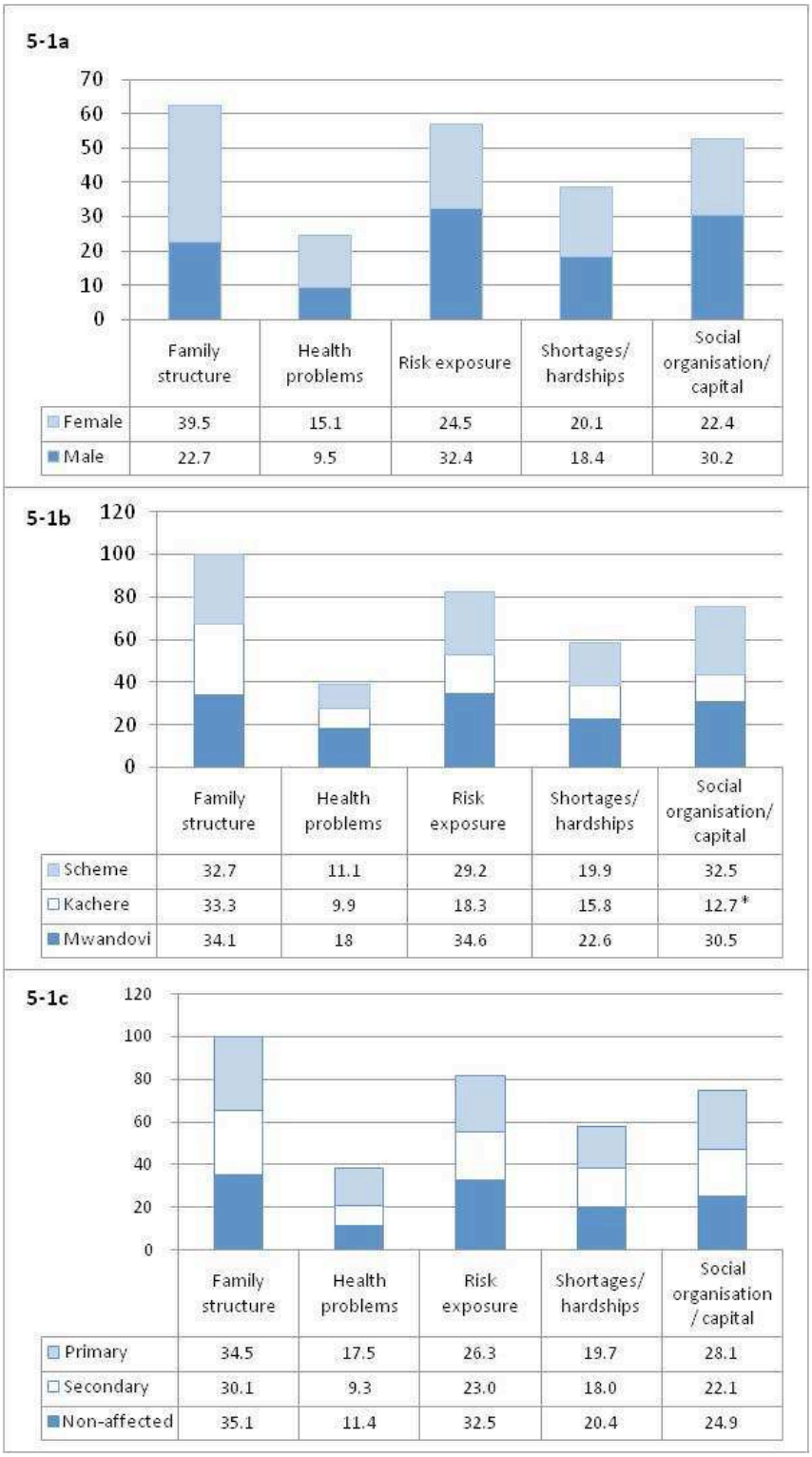


Figure 5-1 Comparison of frequently cited concepts in narrations (expressed as a mean number of times cited per respondent) by gender (5-1a), livelihood systems (5-1b), and impact levels (5-1c)

* Kruswal-Wallis test: significantly different (P≤0.05) from the other groups.

The concepts categorised in the 'Social organisation/capital' cluster, were cited more often by the respondents in Mwandovi village and Hara Irrigation Scheme compared to Kachere village. The respondents in Mwandovi village and Hara Irrigation Scheme based their livelihoods on a rather homogeneous livelihood involving collective activities, possibly leading to relative resilience in social capital. Other contributing factors could be the presence of Hara Water Users Association in Hara Irrigation Scheme and Farmer Field Schools (FFSs) in both Mwandovi village and Hara Irrigation Scheme. These might constitute an enabling environment for new social relationships to emerge. In contrast, the location of Kachere village, due to its proximity to the Uliwa trading centre, on the one hand offers wider opportunities for income and livelihood, but on the other hand may result in more diversified livelihood strategies and individualised decision-making behaviours compared to the other two, irrespective of AIDS impacts. A more diversified livelihood system with weaker foundations for social organisation could aggravate social immunity.

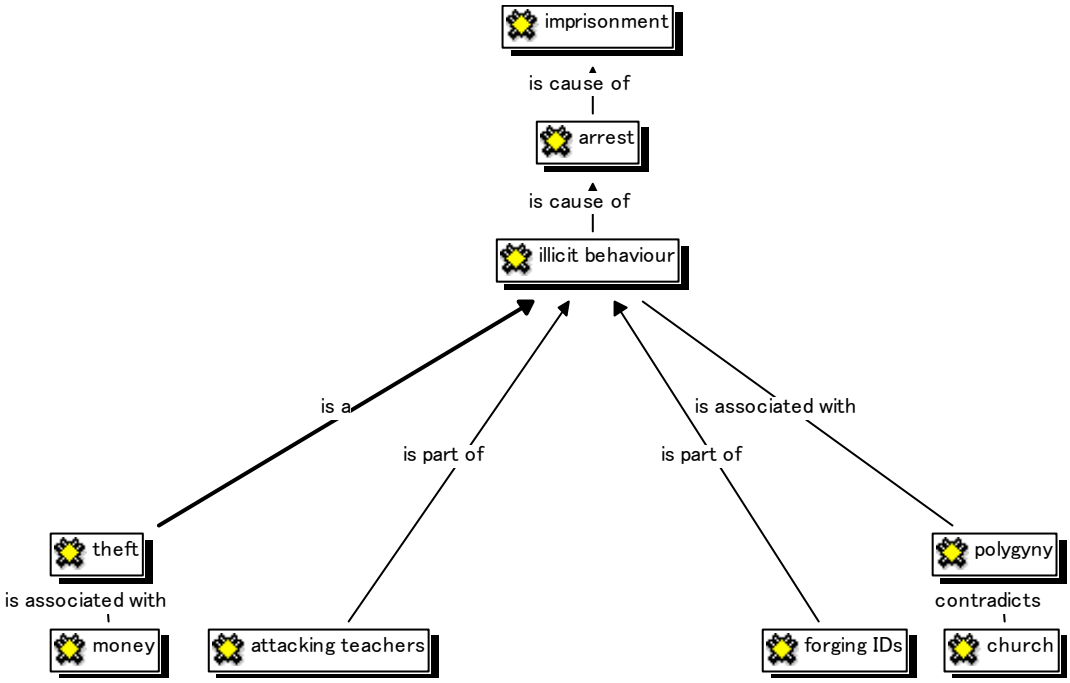
Norms of behaviour

Respondents talked about 'illicit behaviour' (something illegal), such as forging an identification document or misusing collective funds, as opposed to 'bad behaviour' (socially not accepted, regarded as 'bad' or deviant, although part of everyday life), such as dancing in a band, and "*uhule*". The word "*uhule*", interpreted as "sexual immorality culture" (Mtika 2000; Kaler 2001), derives from the English word 'whore',[24] and in our study included many types of sexual behaviour considered to be immoral, such as selling sex for survival, extramarital affairs, or going about with multiple sexual partners resulting in, for example, pregnancy from an unspecified or unidentifiable male partner. The conceptual distinction between 'illicit behaviour' and 'bad behaviour' is illustrated in Figure 5-2 (drawn in Atlas.Ti).

The frequency with which these concepts were used did not significantly correlate with gender nor with AIDS impact levels, indicating that these concepts are commonly used by respondents in all categories.

[24] Manzunda, R.B., interview by author. 15/09/2008, Chilumba.

5-2a 'illicit behaviour'



5-2b 'bad behaviour'

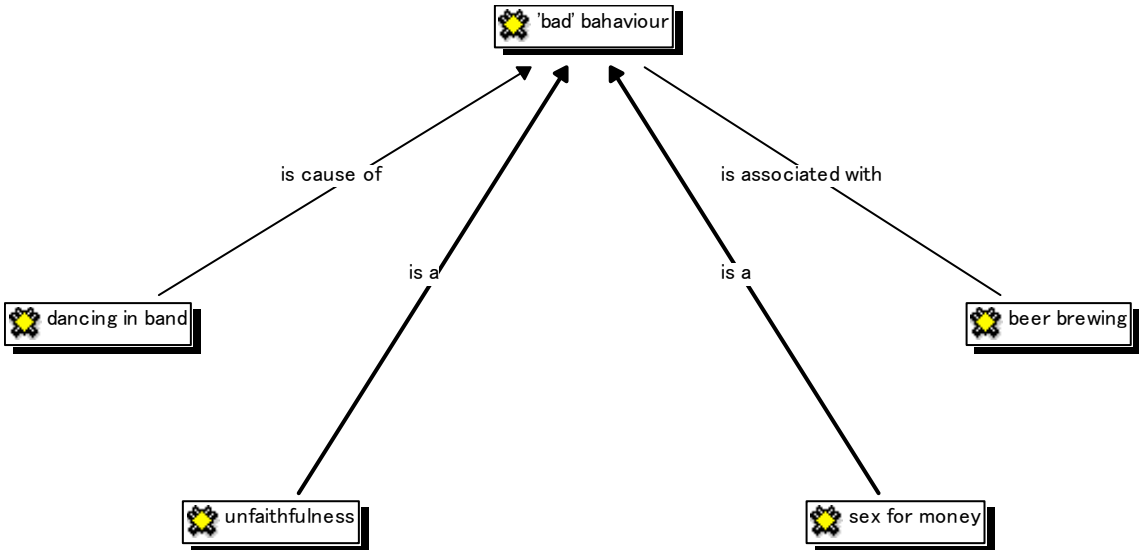


Figure 5-2 Concept of 'illicit behaviour' (5-2a) versus 'bad behaviour' (5-2b)
Drawn in Atlas.Ti (version 5.0, Scientific Software Development 2004)

Implications of new terminologies, language metaphors

During the life history narrations, respondents reported that norms and perceptions related to AIDS had changed over the past few years. For example, among those in the 'affected' category, a readiness to discuss AIDS-related topics, and an opening up to discussion of the challenges was noted, linked to their experience of sicknesses and deaths in the family and community. Other contributing factors noted by the respondents were the increased availability of ART over the study period and observation of the consequences of certain types of behaviour within their community. The emerging metaphors could be interpreted to reflect the magnitude of the AIDS epidemic. However, it could also imply that AIDS is gradually becoming a social norm.

Critical events, life choices

Respondents often perceived that one's fate is not only due to an individual's capacity or effort alone because access to resources often is not based on equal opportunities and reward does not always reach those who deserve it, but good fortune comes to whoever is 'lucky'. Notably, the uncertain, unpredictable, fragile nature of life in Malawi was often referred to during the narrations. Sudden tragedy and misfortune may occur without reasonable cause and are a concern for all respondents in all three livelihood systems and impact levels.

It was observed, moreover, that learning about their serostatus worked as a strong motive for some respondents to join groups for assistance, to open up to discussion of their future, and reducing their stigma. The respondents in 'affected' categories, namely those in primary and some in the secondary category, seemed to be developing higher thresholds of social immunity and demonstrating higher confidence in managing their risks and vulnerability with the help of, or by taking up leading roles in, AIDS support organisations, or by receiving ART. Their life histories demonstrate awareness and control over their fate. Of all the conceptual codes in their narratives, 'children' was the most frequently cited. Children were considered as important assets, a significant household workforce, and an investment in future welfare. This is also symbolised by the fact that 'school' was the second most frequently cited and the most frequent one in the cluster of social capital. The strong perception of children as beneficial enhanced by increased risk awareness and perhaps also because of a certain fatalism induced by the already unstable nature of their

livelihoods could be a reason why the 'affected' respondents were positively continuing to plan their lives.

Discussion

Changing environments

AIDS poses an enormous socioeconomic challenge. However, other equally challenging issues coexist in rural Malawian livelihoods, conferring social instability and uncertainties over an individual's lifetime (Chapter 4) and these need to be recognised in public health programming. For example, the tendency of children's education to be compromised due to AIDS has been reported in Uganda (Kakuru 2006; Karuhanga Beraho 2008). The importance of children and trying to minimise the need for children to migrate on the death of a parent or for reasons of schooling (Ansell and Young 2004) should be incorporated in such programmes. Also, the fact that illnesses and deaths from a variety of causes already were among the most serious threats in rural Malawi prior to the onset of the epidemic (Mtika 2000) also deserves recognition in AIDS programming.

In the case of Malawi, inequality in accessing ART roll-out based on region, gender and age has been reported, indicating specific need for improved access in the Northern Region and for men and children (Makwiza, Nyirenda et al. 2005). The access rate of ART in Karonga District was reported to be only 3% of the total projected number of HIV positive patients as of December 2005 (Makwiza, Nyirenda et al. 2006). In addition, there are concerns about ART such as drug resistance (Deeks 2003; Calmy, Klement et al. 2004; Clavel and Hance 2004), adverse effects including hepatic steatosis (Carr 2003), and adherence to the treatment regime. Public and individual awareness of the risks of infection remains low: one study conducted between 2003 and 2005 has reported that only 16% of People Living With HIV/AIDS (PLWHAs) in Malawi were aware of their serostatus (Aberle-Grasse, Diaz et al. 2009). In addition to debates on equity in accessing AIDS-related health services (Farmer 1999; Greener 2004; Whyte, Whyte et al. 2004), scaling up in resource-poor settings (World Health Organization 2002; Manzi, Zachariah et al. 2005), financing, institutional support, and monitoring to facilitate ART roll-out remain major challenges (Makwiza, Nyirenda et al. 2006). Nevertheless, the increasing availability of VCT and ART has shown positive impact in reducing stigma and discrimination in the study area. This development is strongly supported by NGOs (such as NAPHAM) and local initiatives (such as locally established

CBOs). The respondents were willing to discuss AIDS-related experiences with confidence with the research team. For instance, in this study some respondents in the 'affected' (primary) category reported that they were monitoring their CD4 count, adhering to dietary recommendations and the ART instructions (if they were on therapy), and urging others to go for VCT. In western Kenya, it was found that some of the HIV and AIDS-affected households had improved nutritional level compared to the non-affected households with the assistance of a local NGO (Murphy 2008).

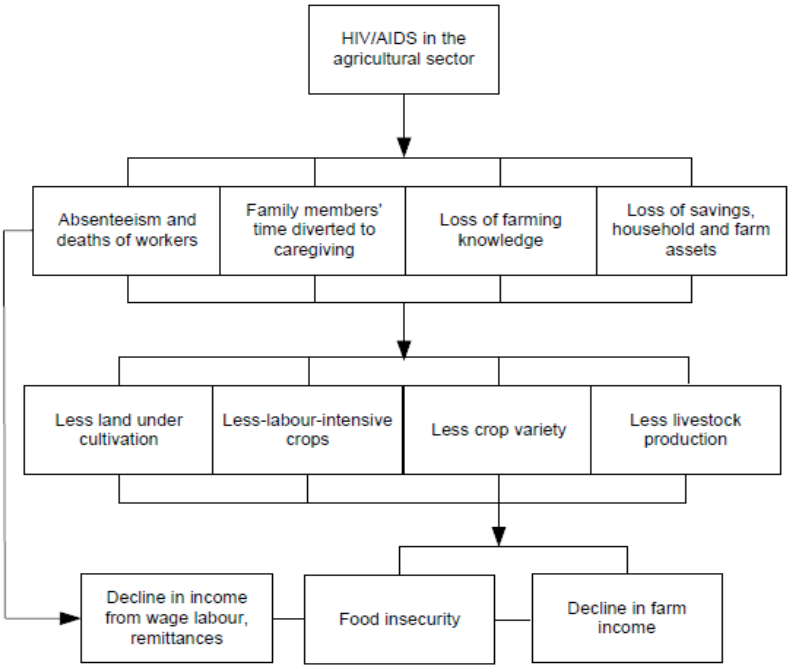
Changing perceptions and social norms

The AIDS epidemic has stimulated reflection on traditional social, sexual norms and behaviours (Kaler 2003; Smith and Watkins 2005). In this study, access to VCT and ART services and the presence of social organisations is reported as stimulating perceptual changes that contribute to reducing stigma and discrimination and to an opening-up of public discussion. While those in the secondary (indirect) and especially in the non-affected impact categories tended to demonstrate strong fear and anxiety about their future, some of those in the primary (direct) impact category, as well as in the secondary, seemed to have been empowered by knowledge and sharing of experience and by the new social organisations, and were starting to be positive about their lives. This discussion leads to a new hypothesis: while traditional social immunity through extended families is collapsing, a higher threshold of social immunity could emerge through social organisation, starting, counter-intuitively, among those with higher exposure to HIV once they come into contact with service and support organisations.

New dimensions

We would like to take the discussion of the public health implications further in terms of the 'New Variant Famine' hypothesis and the flow of events suggested in the UN diagram shown in Figure 5-3a (Department of Economic and Social Affairs and Population Division 2004).

5-3a Conceptual framework for the impact of the AIDS epidemic on agriculture



5-3b Counter-reaction proposed in this study

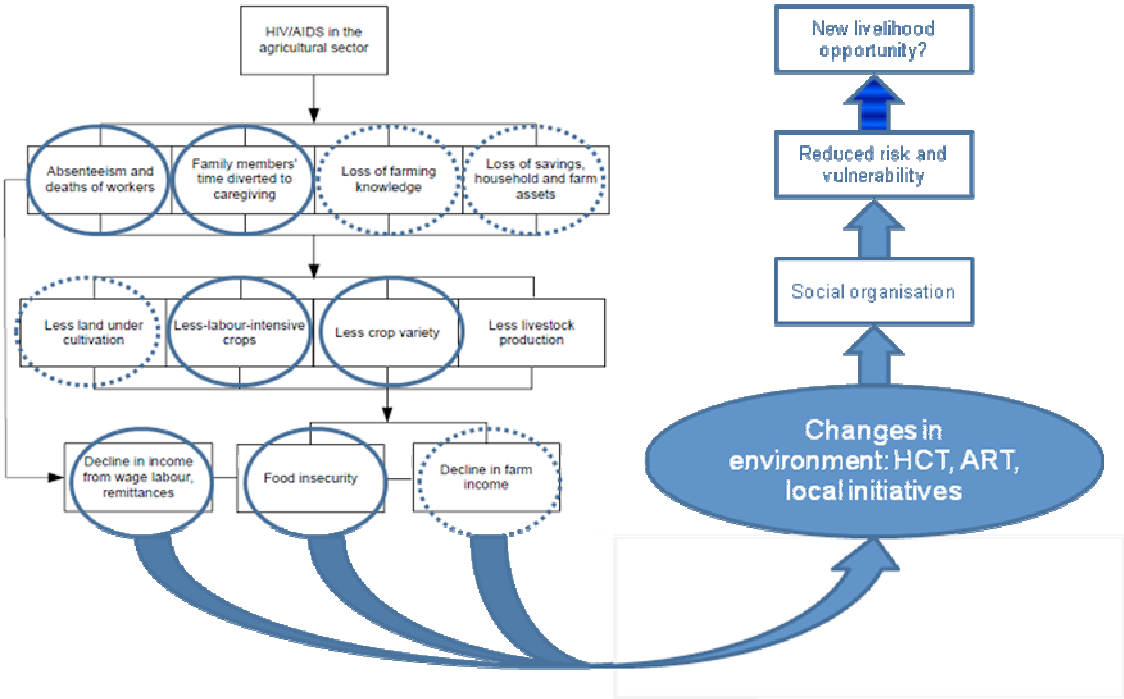


Figure 5-3 Conceptual framework for the impact of the AIDS epidemic on agriculture (5-3a) and counter-reaction proposed in this thesis (5-3b)
Source: United Nations (Department of Economic and Social Affairs and Population Division 2004) and conceptualisation of this study

Our analysis suggests that, although downward pressure on livelihoods and agriculture is occurring, there is also a counter-reaction. In Figure 5-3b, we show our findings by the means of circles (unbroken, strong results and dotted circles, weaker indicative results) and as a counter-reaction among those who are directly impacted. It is these individuals – who might seem the most impacted – who are becoming involved in social organisations or community-based support groups for counselling, treatment and care, so that they have access to social institutions that are helping them to cope with their problems. We hypothesise that this over time could reduce risks and vulnerability and might eventually open up possibilities for new livelihood opportunities.

Conclusion

Our life history analysis suggests two results that are important for public health programmes: (1) the need to place AIDS issues in the context of a range of lifetime risks confronting the farmers in rural Malawi, and (2) the affected individuals who are aware of their status can strengthen the control over their risks by sharing knowledge and experiences through social organisation. In this way, community organisations will be strengthened, countering the downward spiral proposed by the 'New Variant Famine' hypothesis.

6 Farmer Field Schools in Malawi: lessons learned for improving livelihoods for small-scale farmers in Africa

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Abstract

We assessed the relevance of implementing Integrated Pest Management (IPM) in cassava as a subsistence crop through the Farmer Field School (FFS) approach for small-scale farmers in northern Malawi. The history of IPM/FFS in Malawi is explained. The data were collected by analysing an inventory survey of the Ministry of Agriculture, carrying out key-informant interviews with NGO practitioners and donors, observing FFS sessions in Karonga District, and participating in national FFS stakeholder workshops. The analysis indicates that FFSs were treated as a variant of conventional group-based demonstration with preselected solutions to predefined problems. To meet the challenge of FFS implementation, policy reform and training of both extension staff and farmer facilitators would be required. Major constraints identified in cassava cropping have been related mostly to institutional issues such as access to improved varieties rather than problems of low yield or pest and disease management. For that reason, a more flexible and wider focus for FFS in curricula design is recommended.

Keywords: Malawi, Farmer Field Schools, Integrated Pest Management, cassava, subsistence crop

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[25] Submitted in October 2009

Introduction

The use of Farmer Field Schools (FFSs) to promote Integrated Pest Management (IPM) has spread throughout the world, including Sub-Saharan Africa (Braun, Jiggins et al. 2006). In Malawi, the success of IPM/FFSs has had mixed results since their introduction in the late 1990s (Kamwela and Sande 2007). This paper explores the relevance of IPM/FFSs to improve the livelihoods of subsistence farmers, taking cassava growers in northern Malawi as an example. A major issue noted in the evolution of cassava FFSs in Malawi is whether the biophysical crop protection measures developed by science are of sufficient importance to small-scale cassava producers. If these do not motivate their participation in FFS, are there other science-informed novel crop husbandry practices and management issues that address their actual constraints? The key policy issue that arises, in a country where the public extension structures are weak, and policy support for poverty-oriented agricultural development has been volatile, is whether there is sufficient justification for cassava-based FFSs. Could FFSs be the vehicle through which the cassava-based farming population in northern Malawi is motivated to improve its livelihoods by means of crop protection and management?

This paper first sketches the context. It then analyses the results of a literature review and an inventory survey conducted by the Ministry of Agriculture and presents key informant interviews conducted with major FFS practitioners throughout Malawi as well as field observations of cassava cropping practices and FFS experiences in northern Malawi between 2005 and 2008. Thereafter, the paper looks at the discussions at two national FFS stakeholder workshops held in April and December 2007. By documenting and analysing the data in relation to field experience, the paper then identifies key challenges for agricultural policies on agricultural education and extension, and suggests potential implementation and policy measures in relation to the relevance of IPM/FFS investments in the wider context of Sub-Saharan Africa, focusing on cassava as a subsistence crop.

Context

Food security in Malawi

Eighty-eight percent of Malawi's population lives in rural areas (National Statistical Office of Malawi 2005). Most are subsistence farmers engaged in rain-fed agriculture, depending on a uni-modal rainy season, with limited use of irrigation (Malawi

Investment Promotion Agency 2009). Maize is the main staple food crop, covering 80% of the cultivated area (Morris 2004). Malawi has the highest population density in the Southern Africa region estimated in 2005 at 115 people on average per square kilometre (United Nations Population Division 2009). The mean landholding size is between 0.2-0.3 hectare (Potts 2006), with limited possibilities for crop rotation and fallow (Ngugi 2002). Malawi has experienced recurrent food shortages, with severe deficits in domestic maize production particularly in 1987, 1992, 2002, and 2005 (Chinsinga and O'Brien 2008). Synthetic pesticides are used in commercial crops (Abate, van Huis et al. 2000) and only negligible amounts are applied to food crops (Hillocks 2002a). Cassava in northern Malawi is grown as a low-input crop, mainly for subsistence, and is of secondary importance nationally.

Changes in maize production environment and responses

The volatility of maize production often is attributed to haphazard climatic conditions such as erratic rainfall and waterlogging caused by flooding (Menon 2007). Statistical evidence from 1970 through 2006 indicates an increasing drought and flood frequency, affecting a growing number of people (Université Cathoique de Louvain 2008). Smallholder farmers have reported changes in rainfall patterns and temperature which, exacerbated by changing government policies and weak institutional capacities, are aggravating food insecurity (ActionAid International 2006).

Nitrogen deficits and droughts are considered as the most important threats to maize production (Zambezi and Mwambula 1996). Access to fertiliser subsidies has become a decisive factor for maize production as it increases output dramatically when rainfall is favourable, lifting yield by up to three times that achieved under traditional practices (Carr 1997).

In order to supplement the low productivity and offset rising costs of inorganic fertilisers (Levy, Barahona et al. 2004), input subsidies have been provided under various schemes since the country's independence in 1964. Universal subsidies were provided until 1994, and under the new democratic government, the input subsidy scheme was continued until 1996 when it was withdrawn due to the pressure from donors against corruption (Chinsinga and O'Brien 2008). The subsidy programme was reintroduced in 1998 (Starter Pack Programme; 1998 –2000) and scaled down in 2000 (Targeted Inputs Programme; 2000-2005). Thereafter, the Agricultural Input Subsidy

Programme (AISP) based on vouchers was introduced with a budget of $34 million in 2005 (UN Office for the Coordination of Humanitarian Affairs 2005). The programme did not receive donor support in the first year. In the 2006/7 planting season, the programme absorbed 45% of the budget of the Ministry of Agriculture and 5.2% of the national budget, costing US$91 million in total (Chinsinga and O'Brien 2008; Minot and Benson 2009). During the first year, the scheme experienced a number of management problems with regard to input supply procurement and voucher administration to target beneficiaries. In 2007, however, maize production marked a record surplus of more than one million metric tonnes, mainly because improved smallholder access to agricultural inputs coincided with favourable rainfall; this improved the food security of many small-scale farmers (Chinsinga and O'Brien 2008). This experience is often referred to as a 'smart subsidy' success story that other African countries should learn from (Minot and Benson 2009).

Cassava

Cassava is regarded as a famine-reserve crop in Malawi due to its relative tolerance to poor soil conditions and droughts (Hillocks 2002a). The crop has become increasingly important over the last two decades (Hillocks 2002a; SARRNET 2002; Haggblade and Zulu 2003) for household food security and as a cash crop. The importance of cassava is highlighted in relation to labour losses resulting from the AIDS epidemic (de Waal and Whiteside 2003; Gabre-Madhin and Haggblade 2004; Bryceson and Fonseca 2006; Chapter 3) because it is generally considered that overall labour demand is lower compared to other staples (Hillocks 2002a) and also because labour demand in weeding, harvesting, and processing can be distributed over time (Fermont 2009).

Historical background to agricultural training and extension policy in Malawi

Individual contact was the dominant extension activity in the past, based on concepts such as 'master farmer' and 'spontaneous diffusion' (Rogers 2003; Leeuwis and van den Ban 2004). Group approaches were recognised as more efficient in the 1970s (Ministry of Agriculture and Irrigation 2000). In 1981, the block extension system (Ministry of Agriculture 1987), which is a modified form of the training and visit (T&V) system (Benor and Harrison 1977), gave more emphasis to subject matter specialists and was widely adopted (Ministry of Agriculture and Irrigation 2000). However, particularly since the 1990s, public extension services have faced serious challenges

and have been criticised for their insufficient coverage, irrelevance, inefficiency, and lack of capacity (Ministry of Agriculture and Irrigation 2000; Snapp 2004). For example, surveys conducted in the Central and Southern Regions of Malawi have shown that only 5% of smallholder farmers are reached by agricultural extension staff (Shah, Osborne et al. 2002; Snapp 2004) and have failed to achieve the expected impacts. Following the adoption of a Structural Adjustment Programme (SAP), the recruitment of new staff was suspended from 1995 onwards (Qamar 2003). The ratio of farmers per extension worker was 2,000:1 to 2,600:1 in the Southern Region of Malawi (Nyirenda 2007). As of 2008, 45% of extension staff posts (1,284 positions out of 2,880) in Malawi remained unfilled (Nkhoma 2008), and delays in paying salaries has lowered the motivation of existing staff members. In Karonga District, only 39 out of 53 sections (74%) in Karonga District were manned by qualified extension staff.[26] The situation is aggravated by resignations, retirement, and deaths due to the AIDS epidemic (Ministry of Agriculture and Irrigation 2000).

The lack of resources and incentives remain major challenges to providing occupational education to farmers. The potential of alternatives to supplement the weak capacity of official agricultural extension has long been recognised (Jiggins 1977) and, in Malawi, the roles of NGOs and private sector have become increasingly important (Rusike and Dimes 2006).

IPM/FFS in the context of Malawi

The FFS movement started in Asia in the 1980s as a response to an over-dependence on synthetic pesticides in irrigated rice cultivation (CIP-UPWARD 2003). FFSs were originally designed to help farmers apply IPM practices adapted to their particular agro-ecological conditions (van den Berg 2004). IPM/FFSs were first introduced in Malawi in 1997, when five master trainers from the Ministry of Agriculture participated in season-long trainings of trainers (ToT) in Zimbabwe and Ghana during the 1997/98 planting season by FAO. Thereafter, a season-long ToT was conducted in Salima involving 30 government staff in 2003. However, only limited information till now has been available concerning the follow-up and subsequent experience of IPM/FFS implementation.

[26] Munthali, L.A.P., interview by author. 15/09/2008, Chilumba.

Although the FFS approach has been implemented successfully in Asia and some African countries, the relevance of IPM/FFS programmes in Malawi, particularly in relation to subsistence food crops, has been questioned (Hillocks 2002a; Orr 2003; Snapp and Minja 2003; Morris 2004; Orr and Ritchie 2004), principally because of the following reasons:

- Economic loss from pests and diseases in subsistence food crops is either low or not perceived.
- The use of synthetic pesticides on food crops is negligible because it is not profitable. Therefore, pesticide problems are almost nonexistent.
- Limited relevant IPM options are available to resource-poor subsistence farmers.
- IPM/FFS approach requires additional labour and time from the farmers.
- Declining soil fertility and drought are major, dominating factors of production constraints.
- Large-scale crop protection programmes (e.g., classical biological control) do not require farmers' involvement.
- Some pest problems are difficult to address in country- or region-wide intervention programmes because they are dynamic and site-specific.
- National policies are not conducive to support the expansion of farmer training and education.

Methodology

Literature review

The study was initiated by a literature review and exploratory field research (Yajima, Chiwona-Karltun et al. 2005; Yajima, van Huis et al. 2007).

Inventory survey by the Ministry of Agriculture

The inventory survey started in 2005, when only two out of the five master trainers remained in the Ministry of Agriculture. As a follow up to their previous ToT course held in 2003 in Salima (facilitated by the three trainers then remaining), the course involved 30 staff members of the official extension service (Phiri and Kamwela 2003; ToT on Farmer Field School course participants 2003). For the purpose of this study, one of the master trainers inventoried the situation of IPM/FFSs in the eight Agricultural Development Divisions (ADDs) in March-April 2006. The information gathered was used to understand the impact of the ToT and to scope the prospects for

further expansion. The survey results were reported in an internal working paper for the Ministry of Agriculture in 2006. This was made available to the author, who extracted and consolidated the data presented in this chapter.

Key informant interviews with NGOs and stakeholders

Between October 2005 and November 2006, we interviewed the following key informants, identified through reputational sampling (N=35), including practitioners and stakeholders involved in FFS-related activities: major development and donor organisations (4), Ministry of Agriculture (11; in extension, research, and headquarters), NGOs (17), University of Malawi (2) and one farmer (1). The interviews were recorded and analysed using discourse (van Dijk 1985) and content analysis (Patton 1980).

Observation of cassava FFSs

Between 2006 and 2008, the sessions of two cassava-based FFSs in Chilumba, Karonga District, were observed; selected participants (in total N=21) and 2 extension staff were interviewed on their experiences (recorded as field notes and analysed as ethnographic material).

National FFS stakeholder workshops

On 24-25 April 2007, the first national meeting, 'Workshop on sharing experiences on FFS in Malawi', was convened in Lilongwe with the technical support of CAB International Africa. Major financial support came from the Norwegian Agency for Development Cooperation through the Agricultural Research and Development Programme, located in Bunda College, and FAO Malawi. Building on the first workshop, a second workshop was organised in December 2007 with a smaller working group to move the discussion forward. This second workshop was proposed and sponsored by CAB International Africa. Participation in this process enabled the author to observe, extract, and analyse (Patton 1980; van Dijk 1985) relevant issues from the contents of proceedings, presentation materials, and the rapporteur's notes.

Results

Inventory survey of FFS in Malawi by the Ministry of Agriculture

According to the survey conducted by the Crop Production Department of the Ministry of Agriculture, between 2003 (ToT course) and 2006, 84 FFSs had been concluded by 10 out of the 30 ToT graduates and their fellow government extension staff (Table 6-1;

Box 6-1). The FFSs involved 1,279 participants; 53% of them were men while 47% were women. Nearly half (38 schools, 45%) of the FFSs were implemented in Karonga District. Sixty-three percent of the total (53 schools) included maize, while 12% (10 schools) included cassava in their curricula. Nineteen percent (16 schools) were implemented in collaboration with NGOs while 4% (3 schools) were partially funded by FAO Malawi.

Box 6-1 The season-long Training of Trainers in Salima in 2003 cost 8 million kwachas (Sande, M.H.L., interview by author, 24/02/2006, Lilongwe), equivalent to US$74,074 (in August 2003, a policy decision was made to stabilize the Malawi Kwacha at a rate of K108 against the U.S. dollar (Simwaka 2007)). The purpose was to train 30 government staff for 4 months. This means that the ToT cost roughly US$2,470 per participant. According to the inventory survey, three of these participants were officers in regional and central agricultural offices, and, out of the 27 remaining field staff, five left the position by either retirement or by joining another section or organisation and only ten participants were found to be implementing FFSs. The inventory found 84 schools were implemented after the ToT, which indicates that ToT cost per school was US$882.

The curriculum of FFS in each case focused on agronomy (variety, plant population, intercropping, fertiliser application, and nutrient management), IPM strategies (e.g., varietal resistance, cultural control), as well as on specific pests and diseases, such as maize streak virus in Kasungu and Mzimba and white stemborer in coffee in Chitipa District.

Table 6-1 Inventory of IPM/FFS conducted by Ministry of Agriculture in Malawi up to March 2006

Agricultural Development Divisions (ADDs)	Number of FFSs	Number of graduate farmers	Crops covered[1]							
			Rice	Maize	Cassava	Sweet potato	Beans	Ground nuts	Coffee	Vegeta-bles[2]
Karonga	38	620	7	25	6			2	4	1
Mzuzu	5	124		3						4
Kasungu	12	- *		12						
Salima	9	187	4	4	5					
Lilongwe	8	83		4			4			4
Machinga	8	137	5	1		1				
Blantyre	1	38		1						
Shire Valley	3	90		3						
Total	84	1,279	16	53	11	1	4	2	4	9

Source: follow-up survey, March-April 2006, Crop Production Department, Ministry of Agriculture, Malawi

1: one school can include more than one crop

2: including cabbage, tomato, onions, Irish potatoes

*: data missing

Some of the FFSs on rice, vegetables, and maize included spraying of agrochemicals as part of the 'recommended' strategies. In addition, nearly all maize-based FFSs included application of inorganic fertilisers in nutrient management trials. No cassava-based FFSs, however, included the use of synthetics.

Box 6-2 The three rice-based FFSs in Nkhotakota (under Salima) and one in Karonga included the use of a herbicide (Lonestar) as a labour saving technology, and one in Nkhotakota addressed control of *Azolla filiculoides* with herbicides (rather than its use as a natural fertiliser) because it was erroneously considered to be a weed. The four FFSs on vegetables in Mzuzu ADD included the use of Cypermethrin (a synthetic pesticide) and Multifeed (an inorganic fertiliser) on cabbage as well as Cypermethrin, nematicides, and Dithane™ M-45 (fungicide) on tomatoes, particularly in the seedling nurseries. Two maize FFSs in Karonga included synthetic herbicides, namely Roundup (glyphosate) and Bullet. In other cases, maize FFSs in Karonga also included spraying of a botanical pesticide derived from *Tephrosia volgelii* against stalkborer.

Key informant interviews with NGOs and other stakeholders

Other FFS-related experiences have been sporadic. Five NGOs[27] had implemented the 'FFS approach' in their projects on a pilot scale, and three NGOs[28] were planning FFS implementation at the time of the interviews in 2006. A consortium of seven NGOs[29] working in seven districts in Malawi had organised a study tour to Uganda in September 2005 in order to assess the feasibility and relevance of the FFS approach for their respective projects (Vasulu 2006) and two of these NGOs[30] subsequently implemented pilot projects.

There have been few cassava-based FFSs, other than those implemented within government extension systems: one NGO focused on cassava using FFS for improving food security in the Central Region;[31] two commercial cassava farmers in the Central and Southern Regions, who were exposed to the concept of FFS, adopted the FFS approach to work with their fellow farmers[32] (CTA 2008); and Junior Farmer Field and

[27] Concern Universal in Dedza, CADECOM, NASFAM, WorldVision in Zomba, WorldRelief.
[28] Catholic Relief Services: CRS, Evangelical Lutheran Development Service: ELDS, Plan Malawi.
[29] Africare, CARE, Catholic Relief Services: CRS, Emmanuel International, Save the Children US, The Salvation Army and WorldVision Malawi.
[30] CRS and WorldVision.
[31] Nkanaunena, G., interview by author. 24/05/2006, Lilongwe.
[32] Phiri, A.K., interview by author. 23/05/2006, Lilongwe.

Life Schools (JFFLS) under FAO Malawi have included cassava in their planting trials (FAO Malawi 2008).

The FAO in Malawi implemented eight JFFLSs in 2007 in Mangochi and Ntcheu Districts, targeting children and youths, and established trial gardens at eight primary schools with variety of vegetables, staples, legumes, fruit trees, and cassava. In 2008, the project expanded to include Mchinji, Lilongwe and Machinga Districts, reaching 41 schools involving 1,640 participants (FAO Malawi 2008).

Other FFSs include those run by the Smallholder Coffee Farmers Trust (SCFT) Malawi, founded in Mzuzu in 1999. It has been using FFS since 2004 with the support of government research and extension systems and backstopped by CABI Africa (Kaunda 2007). It has conducted 32 FFSs with 557 graduates on coffee; half of the schools (16) focussed on coffee stemborer control methods (Kaunda 2007).

Overall curricula typically have been developed with input from government staff or external organisations such as CABI Africa and FAO Malawi. The FFSs supported by NGOs together with government staff have tended to focus on adoption of predetermined recommendations as one of the main goals, enhanced by the use of agro-ecosystem analysis (AESA) (Chizimba 2007). In some cases, especially when practitioners were not familiar with FFS principles, the FFSs did not cover the entire growing season nor involved regular meetings.[33]

Cassava FFSs

The two cassava-based FFSs implemented by a government extension agent in the Chilumba area, Karonga District, were observed by us between 2006 and 2008. One of the two FFSs (*Taonga* FFS) completed a full season-long session during our study. However, the other group (*Fwasani* FFS) experienced water stress that ruined the crop in the trial plot due to nearby Eucalyptus trees in the first season, and the loss of the chairperson disrupted the activities in the second season. Further, the facilitator (the extension agent) was absent on training leave part of the time. Although several farmer facilitators were running rice FFSs, they did not emerge from the cassava FFSs.

[33] Phiri, W., interview by author. 01/09/2006, Salima.

Some of the FFS participants commented that farmer facilitators, as their fellow farmers, were not in a position to 'teach' them[34] and this discouraged their participation. The dropout rate for the cassava FFSs was between around 5% and 22%, while it was between 15% and 25% for rice FFSs. The major reason for dropping out was loss of interest after farmers realised that they did not receive the benefits they had expected, apart from access to the planting materials and the produce from the trial plots.

The overall curriculum of the cassava FFSs was developed as a result of preliminary discussion between participant farmers and extension staff, followed by a 'gap analysis' by extension staff that compared farmer practices and recommended methods. The curriculum included planting system studies (ridge alignments and traditional mounds called *vindungumbwa*, spacing, length and depth of planting materials), varietal trials (uses of local and improved varieties, certified cuttings) and manure application.[35]

However, our interviews with the farmers in the Chilumba area indicated that about 20% of them did not allocate any labour at all to pest and disease management (Chapter 2). The most frequently recommended pest and disease control measures for cassava in the area was plant sanitation through the use of improved varieties and virus-free planting materials, as well as roguing of the affected plants (Calvert and Thresh 2002). Farmers reported that the latest improved varieties were not easily accessible and that by joining FFSs or through local NGOs they had been able to acquire the planting materials of the new varieties. Roguing was practised by only 6 to 8% of the farmers, while some farmers perceived cassava mealybug as beneficial to soil fertility (Chapter 2). Others attributed pest and disease prevalence to God's plan (Neuenschwander 1993; Chapter 2). Further, women were the major operators in cassava crop management and FFS participants indicated that women farmers prefer to maintain the local variety '20:20' (bitter variety) even though it is susceptible to cassava mealybug and ACMD.[36] This was because of its taste and the soaking quality of

[34] Munthali, J.T., interview by author. 07/11/2007, Chilumba.
[35] Kamwendo, N.D., interview by author. 02/09/2008, Chilumba.
[36] Mleta, H., interview by author. 29/08/2008, Chitedze Research Station.

the roots during the fermentation process, a local practice for decomposing cyanogenic glycosides in bitter varieties. Similarly, some women farmers indiscriminately or even selectively harvested the ACMD-affected leaves as vegetables[37] (Chapter 2). Some of the participant farmers expressed enthusiasm in learning how to process cassava tubers into starch or other value-added products, but the request was not reflected in the FFS curricula.

Outcomes of two National FFS stakeholder workshops in 2007

The first workshop generated a historical overview of FFSs in Malawi (Kamwela and Sande 2007). The major outcomes of the first and the second workshops are summarised in Table 6-2. After the first workshop, a Malawi FFS steering committee was formed. CABI Africa subsequently agreed to start providing support to the committee by means of technical backstopping in order to strengthen curriculum development and dissemination processes and to help institutionalise national FFS support networks (Malawi FFS Network Committee 2007).

[37] Mahungu, N.M., interview by author. 21/04/2007, Lilongwe.

Table 6-2 Summary of the national FFS stakeholder workshops

	1st Workshop	2nd Workshop
Date	24-25 April 2007	18-19 December 2007
Participants	58 (Ministry of Agriculture, University of Malawi Bunda College, international and local NGOs, FAO and WFP Malawi, CABI Africa)	11 (Ministry of Agriculture, University of Malawi Bunda College, Natural Resources College, WorldVision, Farmers Union Malawi, CISANET, IITA/SARRNET, CABI Africa)
Action plans	1. Mentor study tour to senior officials on policy levels to FFS Network in East Africa, looking at sustainability issues after FFS. 2. Support national steering committee formed as a result of the workshop to develop strategy for scaling up (on different levels) and scaling out (on geographical terms). 3. Fine-tuning FFS curriculum on the national level. 4. Developing dissemination materials and communication strategy. 5. Developing regional collaborative programmes and networks.	Aim • Create a national innovation platform for problem identification, capacity building, uptake of knowledge, policies & processes. • Strengthen linkage/network. • Platform for training farmers, dissemination, discovery, validating, testing, adaptation. Institutionalising FFS in Malawi. 1. Establish a national FFS network. 2. Document brief profile of network. 3. Proposal documentation. 4. Provide FFS resource mapping. 5. Develop draft policy guidelines. 6. Advocacy to donors.

Sources: Malawi FFS Network Committee 2007 ; Masangano, Yajima et al. 2007

Perceived constraints to FFS implementation in Malawi

During the inventory survey, key informant interviews, and the workshops, a number of government officials and extension staff members expressed the main challenge to FFS implementation as the lack of sufficient funding support to facilitate technical backstopping, particularly in Karonga and Mzuzu ADDs where over half of the total government FFSs were conducted. Other practical challenges included the following:

- The loss of trained staff.
- The lack of additional training opportunities.
- The lack of 'farmers' ownership'.
- Managing communal plots.
- Farmers' time and labour required for participation.
- Farmers' expectation of benefits (inputs).
- Participants' absence particularly because of migration for work and marriages.

For example, Nkhotakota reported that their two trained officers had left their posts due to personal reasons and transfers (a frequent occurrence given the overall livelihood insecurity), which caused the FFS initiatives to lapse. Also in Salima, the

maize crops and the water pump used in trials were stolen at the maturity of the crop. NGO practitioners considered the top-down attitude of extension workers as a barrier to successful FFS implementation.[38]

Information access and sharing among organisations also were found to be problematic in a context of already overstretched resources and limited opportunities. The key informants and workshop participants reported gaps in information access and exchange among farmers, research and extension staff, ministry officials, donors, and NGO workers across a range of levels. No information sharing system was in place at inter-organisational and regional levels as each organisation tended to work in isolation. Malawi as a country did not have consolidated information on FFS[39] and was at the time of the study not yet actively participating in the larger international FFS network discussions (http://www.farmerfieldschool.info/). As such, most FFS stakeholders were not aware of the regional Study Group Conference held in Zimbabwe in November 2006 or the FFS networks in East Africa (Masangano, Yajima et al. 2007).

In 2008, 11 years after the initial ToT trainings, only one out of the five initial master trainers remained in the Ministry of Agriculture. As of August 2008, three had passed away, one left the government services, and one is involved in a donor-funded project which is not geared towards IPM/FFS. Five out of the 27 government extension staff who participated in training in 2003 had left their posts by 2006 when the inventory survey was conducted. When the trained staff members left their posts (for better opportunities, or death), expertise and skills were lost, further compromising already weak extension staffing situations. For existing staff, no follow-up of the past training effort was in prospect.[40]

[38] ILIFE-DAP representatives, interview by author. 10/11/2006, Lilongwe.
[39] Langdon-Morris, V., interview by author. 18/07/2006, Lilongwe.
[40] Sande, M.H.L., interview by author. 24/02/2006, Lilongwe.

Analysis and discussion

Evolution of FFSs in Malawi

IPM for smallholder farmers in Africa has followed a different trajectory (Nederlof and Odonkor 2006; Masangano, Yajima et al. 2007; van Huis 2009) from that in Asia, where the trigger was the problems associated with an indiscriminate and injudicious use of pesticides. In Africa, although FFSs initially meant for introducing IPM to smallholders, need not only or at all focus on pests, diseases and weeds. In practice, FFSs have evolved from supporting the growing of a healthy crop to value-added processing and marketing. Descriptive terms such as integrated production and pest management (IPPM) (Youdeowei 2002), integrated crop management (ICM) (Snapp and Minja 2003), integrated soil fertility management (ISFM) (Defoer 2002; Altieri and Nicholls 2003), and integrated nutrient management (INM) (de Jager 2007) have come into common use based on experiences from various parts of Africa, including Malawi (e.g., *Striga* control on maize and pigeonpea, in Snapp and Minja 2003).

In most parts of Africa, FFS curricula have shifted in focus to production, food security and sustainability (van Huis and Meerman 1997; Hillocks 2002b), developing locally appropriate strategies for self-financing, and linking to marketing and networking support (Nzeza 2005; Kimani 2007). Addressing farmers' limited access to resources (e.g., use of locally-available, low-cost materials) and how to maintain farmers' interest also would be relevant in curriculum development. For the farmers to become the centre and driving force of locally-relevant knowledge and innovation, a restructuring of the current training and organisation of FFS to develop new types of professionalism would be essential.

Government extension workers in Malawi for a variety of reasons have made only limited follow-up to the initial ToT. While our study has shown that the FFS approach has been taken up also by NGOs, donors and other organisations, there are considerable variations and contradictions concerning understanding and application of the FFS principles, and the implementation has faced persistent practical challenges. The sessions were not always season-long nor without a planned programme of activities adapted to the location or crop. The farmers' motivation, to some extent, was enhanced by expectation of benefits, which was perceived by some practitioners as a challenge.

Most importantly, the curricula reflected the attitudes and method of conventional official extension practice, and essentially the FFSs have been used to reinforce the adoption of preselected recommended solutions to predefined problems. IPM was found to be only a small component in curriculum design, with no discernible focus in fact on IPM, e.g., the use of agrochemicals were included in trials as 'recommendations', i.e., preselected solutions independent of local agro-ecosystem analysis. The comparative advantage of FFSs lies in exposing farmers to experiential learning by observing, measuring, experimenting, reviewing results, and the interpretation of place-based data (Williamson 1998; CIP-UPWARD 2003; Pontius 2003; van den Berg 2004). There remains considerable confusion between the notion of extension and FFS. In practice, FFSs have been treated as a variant of conventional group-based extension with an emphasis on farmer participation (Nederlof and Odonkor 2006; Masangano, Yajima et al. 2007; van Huis 2009). Practitioners both in the government[41] and NGO sector[42] admitted that the majority of the field workers did not sufficiently understand the principles of FFS nor did those responsible in the Ministry of Agriculture, academia, or the donor community (Masangano, Yajima et al. 2007). A mismatch between the recommendations regarding plant protection measures included in the curriculum and farmers' reality was found in our observation of FFSs. The impact of FFSs in fact has been measured by the adoption rate of recommended methods, as appropriate to the technology-transfer model of extension (Masangano, Yajima et al. 2007), although assessments of FFS' impacts requires different indicators and methods (van den Berg and Jiggins 2007).

On the policy level in Malawi, structural and institutional weaknesses in agricultural development have been recognised. Although IPM is not given a priority in the agricultural policy agenda (Ministry of Agriculture and Irrigation 2000; Nyirenda 2007), FFSs are. Language relevant to FFSs has been included in the extension policy framework, such as demand-driven, information sharing partnerships across districts, sectors and stakeholders, and pluralism (Ministry of Agriculture and Irrigation 2000), but the operational details are not explicit enough to create an enabling environment to support countrywide FFS initiatives. The knowledge and personnel capacity

[41] Kamwendo, N.D., interview by author. 02/10/2006, Chilumba.
[42] Mwendo-Phiri, E.M., interview by author. 05/08/2006, Lilongwe.

developed in the early years has not been sustained largely because of weak organisational capacity in public service and personnel changes as a result of losses and high staff turnovers arising from transfers, retirement and death, and reliance on expatriates. One of the problematic consequences is that cost per trainer/ facilitator per school and per participant remains high. In other contexts in East Africa, these costs have declined steadily as capacity has developed.

The study also observed that FFS efforts in Malawi had been made in isolation, with little sharing of information and experiences among the concerned organisations, farmers, extension, research and trained facilitators, and scarce resources for capacity strengthening were not effectively utilised. The reasons for this include a lack of exposure to good practice and insufficient back-up training. These shortcomings are robustly evidenced by the lack of professional support and effort in developing FFS curricula to provide effective learning experiences for participants that might ensure continued farmer participation.

The study reported here helped to stimulate the emergence of a national FFS platform as a collective initiative of the practitioners who organised the first two national workshops. Collaboration with CABI Africa will give Malawi an opportunity to reaffirm FFS principles and catch up with the FFS movement in the East African region.

Access to inputs

The role of the crop in people's livelihoods affects the availability of inputs. The more food insecure farmers are, the less likely they are to take risks, thereby minimising investments in off-farm inputs (Hillocks 2002b). The current situation, with a focus on intensified maize production, has created an environment conducive to those who have capital for investment and who can take risks, such as wage-earners from urban areas. Availability of credit has become limited in recent years with over 90% of the farmers having no access (Chirwa, Kydd et al. 2006). It is assumed that the improved subsidy schemes will enable farmers to cope better with all kinds of risks and adapt to changes in agro-ecological and socio-economic environment. However, the centralised extension approach and subsidies are increasing farmers' dependence on external support (van Huis 2009) and may discourage them from finding innovative local solutions to their problems.

The improved input subsidy scheme under AISP has shown success in 2005-2007 (Chinsinga and O'Brien 2008). Fertiliser subsidies will continue to be an important policy measure for food security. In Malawi, however, food security is under pressure due to climate change and AIDS. Difficulties in addressing AIDS and poverty issues through separate political measures have been clearly recognised (Barnett and Whiteside 2002). By emphasising input subsidies, and in particular for inorganic fertilisers, it can be argued that farmers will be exposed to more risks. It has induced farmers' dependency on external support and increased their vulnerability to political instability. Climate change may aggravate food shortages and further increase risks and vulnerability, thus undermining livelihood coping strategies in Africa (Orindi 2009), including Malawi (UNDP 2007). What might then confer greater resilience in smallholder farming?

Uniqueness and potential of cassava

Cassava, as a multipurpose and niche crop, offers farmers a range of opportunities. Cassava in the northern lakeshore region of Malawi (including Karonga) is grown for food rather than for cash or exchange (except in emergencies). In the cases of subsistence food crops, the basis of varietal selection is not necessarily or not only high yield or fast maturity alone. Social and cultural properties of the crop, such as palatability, qualities for cooking, and processing and storage, are also taken into account. These considerations imply that prior understanding of locally important factors would be necessary in the development of cassava FFSs. On the other hand, in East Africa (Kimani 2007; Fermont 2009), Democratic Republic of Congo (Nzeza 2005), and the Southern and Central Regions of Malawi (including Salima and Nkhotakota) there is a potential use of cassava as a cash crop with possible industrial application (e.g., confectionery, animal feed, textiles, starch, biofuel). In this case, crop intensification and shifts in farmers' interests might push FFS curriculum development forward a focus on yield increase and marketing.

Commercialisation

It has been suggested that IPM in Africa should concentrate on cash crops which involve pesticide use because reducing pesticide applications by IPM could enhance both market opportunities and sustainability (Orr 2003). Commercial actors could also channel and finance privatised or outsourced extension and advisory services.

However, only 20% of the cassava produced in Malawi enters the market and the subsistence farmers rarely see opportunities for marketing (Schouten 2003).

Especially for the farmers who are shifting from subsistence production to larger-scale commercial agriculture, access to appropriate equipment for the transformation processes become crucial (Hillocks 2002a). The major concern of industries in Malawi has been the quality of cassava flour processed at the household level (Benesi, Labuschagne et al. 2004). Since fresh cassava roots are perishable, they have to be processed into more stable forms shortly after harvest; for most varieties, within two days maximum (Hillocks 2002a). Research into germplasm of new varieties more suitable for industrial use, increased production, and constant supply throughout the year (with high yield and quality optimal for specific usages) are all needed for the commercialisation of cassava flour and other products (Benesi, Moyo et al. 2001; Hillocks 2002a). Improved post-harvest management is also required, as well as new transformation technologies for peeling, grating, boiling, fermenting, drying, frying and milling, as well as storage and packaging.

Conclusion

Crop protection programmes such as classical biological control do not necessarily require participation of farmers. Nevertheless, for IPM strategies, such as cultural control, varietal resistance, or soil fertility management, involving farmers in decision making is crucial. FFSs in the context described in this paper should not only focus on biophysical constraints, but also take a more holistic approach, for instance by including processing, market access, and entrepreneurship in the curricula. The curricula for FFSs should be location-specific and give more emphasis in the context of Malawi on local capacity building and facilitation that can be supported by, but not dependent on, weak government services. In addition, instead of scattering effort among numerous isolated cases, the curriculum should follow the practice developed elsewhere in East Africa of clustering capacity development.

FFSs alone are not sufficient to meet the actual needs of the subsistence cassava growers in northern Malawi. As an investment in adult education, FFSs will need to continue to evolve if they are to prove a cost-effective support for food security and livelihood development.

7 General discussion and conclusions

Introduction

In this final chapter, the initial research objectives are reintroduced and the key findings are summarised in relation to the overall objectives. The results are then discussed in the wider context of Sub-Saharan Africa (SSA), particularly in light of the 'New Variant Famine' hypothesis. Finally, the chapter concludes by offering suggestions for future research.

Objectives and main research questions

The overall objective of this study was to investigate farmers' perceptions of pest and disease management of cassava and how AIDS impacts production and other livelihood opportunities in northern Malawi.

The main research questions were as follows:

- How do the local farmers perceive the production constraints of cassava in terms of plant protection, insect pests and diseases, and management strategies? (Chapter 2)
- How can the AIDS impact be estimated on household level indicators, focusing on family trees, crop patterns, and the food security of respondents? What is AIDS' role in relation to the 'threshold of social immunity'? (Chapter 3)
- How are individual mobility and livelihood systems impacted by AIDS? What are the roles of AIDS in the web of opportunity and stress experienced by households and individuals? (Chapter 4)
- What are peoples' responses to AIDS impact based on estimated impact levels and livelihood systems? How can the changes in perceptions of AIDS-related issues be interpreted in the light of the 'New Variant Famine' hypothesis and the 'threshold of social immunity'? (Chapter 5)
- How did the IPM/FFS movement develop in Malawi and what are the potential contributions of IPM/FFS to policies regarding subsistence crops and agricultural education in southern Africa? (Chapter 6)

Reflections on research methodology and process

Methodological approaches and tools

In this study, several new methods and research tools were devised for data collection in consultation with local research assistants during exploratory work in the field.

The *Bawo* exercise (Chapter 2) used a locally available wooden game board called 'Bawo' as a matrix ranking tool for annual rainfall, crop production, and pest and disease prevalence for cassava during the past four years. The *Bawo* exercise explored localised chronological memory on crop production and management issues. It was a simple and effective way to grasp farmers' perception with involvement of farmers because the game board was familiar to everyone. The results were analysed using statistical software (SPSS).

The *Crop mapping* method (chapter 2) was based on semi-structured interviews (SSIs) and visualisation (using marker pens and flipchart sheets) of field location, landholding size, crop and labour allocation, and food security. The information subsequently was analysed by Anthropac software and manually in association with information on livelihoods and the impacts of AIDS.

Family trees (chapter 3) were drawn during life history interviews, in order to elicit who the respondents considered to be part of their family. The drawings helped identify respondents' own perception of AIDS-related deaths. The family trees, in particular, were then used to elicit information in relation to migration and to look at how living and livelihood systems are structured in order to cope with various shocks and risks or reduce vulnerability. The trees and migration data were subsequently analysed using genealogical software (Legacy).

Life history interviews (chapters 3-5) were developed to deepen our understanding of AIDS impacts and in order to identify concepts distinct to each respondent's contexts and livelihoods. Conceptual analysis was assisted by use of qualitative analysis software (Atlas.Ti).

Complementarity and limitations of methods used

The data collection and analytic tools and methodologies used in this study are compared in terms of complementarity and limitations in Table 7-1.

Table 7-1 Research methods devised

	Complementarity	Limitations
Bawo exercise:	- Easy-to-conduct and well understood, attracted participants' interest, intuitive, by use of a familiar object as a research tool. - It stimulates dynamic, group-based self reflection and verification, quickly generating detailed information on recent cropping history. - Compared to most qualitative data sets, the analysis and interpretation of the matrix scoring is clear and transparent to the respondents.	- Based on people's recall information, which may not always be precise or accurate. - The data builds on perceptions, and should be backed up by actual biophysical information, e.g., meteorological data, field sampling. - Interaction with participants can sometimes be problematic, e.g., there may be dominating participants who steer the responses. In village settings, participants may arrive and leave the exercise at their own convenience, which may affect the results.
Crop mapping:	- Eye-catching drawings, easily understood. - Use of magnifying glasses to observe CGM and whitefly nymphs intrigued many participants. - By visiting their own fields and observing the crops together, the ambiguity of identifying insects and diseases in the local languages was clarified (e.g., *kayuwili* can mean both ACMD and mealybug).	- Takes time because some farms were 2-3 kilometres away. - Difficulty in verifying measurable information, e.g., the respondents were not always aware of the exact sizes of their farms, and this was adjusted by use of 'footstep counting' and indicative references (e.g., football pitch, nearby plots of known size)
Family trees	- After building rapport, most respondents were willing to talk about their family details at length. - Incidentally it generated data on changing norms and perceptions of AIDS by the way respondents discussed their relatives by using new, euphemistic language.	- Takes time and labour, 2-3 times 2-3 hours per participant, and for data entry and analysis. - Sensitivity in discussing former informal and marital partners, deaths, and illegitimate children may have compromised or altered the information.
Life history interviews	- After building rapport, respondents were willing to talk about their life histories. - From respondents' narrations, real-life, vivid incidences related to AIDS were elicited.	- Takes time and labour: 2-3 hours per participant, plus transcription, coding, and analysis. - Translation and coding processes, even with the help of local assistants, inevitably were inflected by the researcher's own interpretation.

Key findings

The main findings of the each chapter are summarised in Table 7-2.

Table 7-2 Key findings of the chapters

Chapters	Research objectives	Key findings	Conclusions
2	To understand perceived production constraints, pests, and diseases of subsistence crop by small-scale farmers in northern Malawi.	Most farmers recognised pests and diseases and other production constraints, but did not take action. The cassava FFS did not have major impact.	The design of FFS and the appropriate curriculum on plant protection are found to be critical. Various challenges to FFSs' relevance to subsistence food crops are identified.
3	To understand AIDS impact on family trees of respondents in relation to different cropping systems.	No significant patterns of social, structural, or cropping system changes were recognised.	The risks of HIV infection are perceived as just one in a continuum of numerous types of risks.
4	To look at individual mobility in life in terms of AIDS impact and livelihood systems.	Migration/mobility is an important component of livelihood strategies and critical life events.	High frequency of mobility does not necessarily mean higher exposure to HIV.
5	To explore people's responses to AIDS based on estimated impact levels and livelihood systems in relation to social organisation and social immunity.	Lower level of social immunity was observed in the more diversified, individualised livelihood system. HIV/AIDS-affected individuals perceived learning about their serostatus as a major turning point, and as an opportunity to be involved in social organisations.	Strengthening the social, organisational and personal capacities of affected individuals, together with an increased access to health services, can lead to a higher level of social immunity.
6	To analyse relevance of IPM/FFS in the case of cassava in northern Malawi, and discuss science and policy implications for agricultural education.	Numerous challenges for science and policy are identified in relation to the past and existing relevance of IPM/FFS investments; currently, FFSs are associated in Malawi with high risks and costs and not used efficiently.	Under changing climatic and market conditions, systematic effort and investment is needed to increase the capacity of farmers to build resilience through occupational education, information exchange, and networking.

Reformulation of the 'New Variant Famine' hypothesis

The 'New Variant Famine' hypothesis (de Waal and Whiteside 2003; Arrehag, de Waal et al. 2006) claimed that AIDS is a major factor contributing to food insecurity in southern Africa. However, this study showed (i) that no simple relation exists between AIDS impacts, small-scale cassava farmers, livelihood systems, and food security; and (ii) that diverse livelihood strategies are beginning to emerge in response to the new environment of increased risks. Indeed, fears of risks and misfortune, either crop failure due to pest and diseases or contracting HIV, were often regarded as fate beyond their control. Nevertheless, labour shortages related to AIDS impacts are being partially covered by new social networks. Recourse to migration as a livelihood strategy in the face of uncertain or insufficient production or cash income was found to be a common practice. The challenges of an increasing number of orphans, malnutrition, and caring for the sick are increasingly being addressed by a number of local and external programming efforts. In addition, it was observed that community-based activities directed towards AIDS support had increased, eliciting the involvement of members of the farming communities in self-directed development of their livelihoods. These trends were seen by at least some community members as positive, and as giving rise to new opportunities for securing a livelihood and local community development.

The study took as a conceptual starting point a general theory of action (Harré 1981: 16):

> If one adopts as a general theory of action, that people are agents acting intentionally in accordance with socially grounded rules and conventions to realize projects, then the entities in need of empirical investigation are clearly defined. We would need to know about intentions and their modes of realization relative to more or less over-arching personal projects.

It has been shown in this thesis that by examining the interplay of AIDS impacts and responses in the context of cassava-based livelihoods in circumstances that in any case challenge farmers to cope with uncertainty and risk it is possible to reveal empirically how people are exercising their agency and developing their perceptions of their livelihoods. The findings of this study overall imply that the 'New Variant Famine' hypothesis is too pessimistic in pointing to an inevitable 'downward spiral' because individuals, communities, and governments do not stand passively aside from 'the

facts' and from lived and felt experience. They are engaged in a 'dance' with the flux of events and their circumstances through time that help shape outcomes that may surprise when generalised labels such as 'poor', 'heavily AIDS-affected' or 'subsistence' are applied to whole populations or areas.

General conclusions: IPM/FFS policy in SSA

Constraints to subsistence crop production in Sub-Saharan Africa are diverse. They include poor soil fertility, adverse climatic conditions, lack of inputs, pest and diseases, postharvest problems, poor access to markets, and so on (Bruin and Meerman 2001). The constraints clearly are not limited to crop protection or production (Fermont 2009). Future investments in FFS, therefore, will have to take account of the major findings of the most recent and thorough assessment of the future needs of agriculture (McIntyre, Herren et al. 2009). These findings have been widely endorsed by governments, leading UN organisations, the Commission on Sustainable Development and a range of civil society organisations. They include:

- The underused potential of millions of hectares of smallholder farming, with its productivity of typically one tonne per ha, holds the best promise for dealing with the current global food and sustainability crisis and for addressing persistent rural poverty, especially in SSA.
- Agriculture is multi-functional. Its function is not only to produce food, fibre and fuel commodities but also to deliver a set of other ecological services, including water, climate change mitigation, biodiversity, etc., which is vital for regenerating and maintaining the troposphere.

In the light of these findings, and the conclusions from this thesis, a number of recommendations for policy and planning relating to IPM/FFS and agricultural education are discussed.

Evolution of FFSs in Malawi

IPM for smallholder farmers in Africa has followed a different trajectory (Nederlof and Odonkor 2006; Masangano, Yajima et al. 2007; van Huis 2009) from that in Asia, where the trigger was the problems associated with an indiscriminate and injudicious use of pesticides. In Africa, FFSs, although initially meant for introducing IPM to smallholders, today need not only or at all focus on pests, diseases and weeds. In practice, FFSs have evolved to support growing a healthy crop, extending to value-added processing and marketing. Descriptive terms such as integrated production and pest management

(IPPM) (Youdeowei 2002), integrated crop management (ICM) (Snapp and Minja 2003), integrated soil fertility management (ISFM) (Defoer 2002; Altieri and Nicholls 2003), and integrated nutrient management (INM) (de Jager 2007) have come into common use based on experiences from various parts of Africa, including Malawi (e.g., *Striga* control on maize and pigeonpea, in Snapp and Minja, 2003). In most parts of Africa, FFS curricula have shifted in focus to production, food security and sustainability (van Huis and Meerman 1997; Hillocks 2002b), developing locally appropriate strategies for self financing, and linking to marketing and networking support (Nzeza 2005; Kimani 2007). Farmers' limited access to resources (e.g., use of locally-available, low-cost materials) and how to maintain farmers' interest are also relevant issues in curriculum development. In Malawi, it has been shown in this study that in order for farmers to become the centre and driving force of locally-relevant knowledge and innovation, a restructuring of the current training and organisation of FFS, and development of new types of professionalism would be essential. Government extension workers for a variety of reasons have made only limited follow-up to the initial ToT. While our study has shown that the FFS approach has also been taken up by NGOs, donors, and others, there are considerable variations and contradictions concerning understanding and application of the FFS principles, and the implementation has faced persistent practical challenges. The sessions were not always season-long, with a planned programme of activities adapted to the location or crop. The farmers' motivation to participate, to some extent, has been secured by expectation of material benefits, and this is perceived by some practitioners as a challenge to the sustainability of the FFS movement. Most importantly, the curricula reflected the attitudes and methods of conventional official extension practice, and essentially the FFSs have been used to reinforce the adoption of preselected recommended solutions to predefined problems. IPM was found to be only a small component in curriculum design, with no discernible focus in fact on IPM, e.g., the use of agrochemicals were included in trials as 'recommendations', i.e., preselected solutions independent of local agro-ecosystem analysis.

The comparative advantage of FFSs lies in exposing farmers to experiential learning by observing, measuring, experimenting, reviewing results, and the interpretation of place-based data (Williamson 1998; CIP-UPWARD 2003; Pontius 2003; van den Berg 2004). In Malawi, there remains considerable confusion between the notion of extension and FFS. In practice, FFSs have been treated as a variant of conventional

group-based extension with an additional emphasis on farmer participation (Nederlof and Odonkor 2006; Masangano, Yajima et al. 2007; van Huis 2009). It has been noted in this study that practitioners both in the government[43] and NGO sector[44] admitted that the majority of field workers involved in FFS delivery do not sufficiently understand the principles of FFS nor do those responsible in the Ministry of Agriculture, academia, or the donor community (Masangano, Yajima et al. 2007).

On the policy level in Malawi, structural and institutional weaknesses in agricultural development have been identified. Although IPM is not a priority in the agricultural policy agenda (Ministry of Agriculture and Irrigation 2000; Nyirenda 2007), FFSs are. Language relevant to FFSs have been included in the extension policy framework, such as demand-driven, information sharing partnerships across districts, sectors and stakeholders, and pluralism (Ministry of Agriculture and Irrigation 2000), but the operational details are not explicit enough to create an enabling environment to support countrywide FFS initiatives.

The study also observed that FFS efforts in Malawi had been made in isolation with little sharing of Information and experiences among the concerned organisations, farmers, extension, research and trained facilitators, and scarce resources for capacity strengthening were not effectively utilised. The reasons for this include a lack of exposure to good practice and insufficient back-up training. These shortcomings are robustly evidenced by the lack of policy support and effort in developing FFS curricula to provide the effective learning experiences for participants that might ensure continued farmer participation.

The study presented in this thesis has stimulated discussion of all these issues and contributed to the emergence of a national FFS platform as a collective initiative of the practitioners who organised the first two national workshops. Collaboration with CABI Africa will give Malawi an opportunity to reaffirm FFS principles and catch up with the FFS movement in the East African region.

[43] Kamwendo, N.D., interview by author. 02/10/2006, Chilumba.
[44] Mwendo-Phiri, E.M., interview by author. 05/08/2006, Lilongwe.

Crop protection

With respect specifically to crop protection, small-scale farmers growing subsistence crops are often not much concerned about quality in terms of market demand and tend to accept some crop loss, as long as they produce a sufficient amount for a living. That is, they may view cropping as just one component of their overall livelihood activities, thus are willing to compromise optimisation in one activity in order to secure the benefits from other activities. At the same time, typically neither input nor output markets serve small-scale farmers well, so there is little incentive for such farmers to optimise crop management. In addition, it could be that farmers simply lack the knowledge, skills or capacity to address quality issues, yet advisory services and occupational education do not reach them.

In the Malawi context, crop protection strategies depend on the crop. When crops are produced for the market, prophylactic interventions are often used, such as spraying of pesticides, although farmers often do not realise that these may create new problems (de Groot 1995) like resurgence, secondary pest outbreaks, and health and environmental hazards. IPM/FFSs have been used effectively in situations where high uses of synthetic chemicals for crop protection create problems. In the case of cassava in Malawi, the focus of FFS should not be only on crop husbandry and crop protection issues. The recommendations for crop protection may not always be relevant for subsistence farmers who are not using synthetic chemicals and who face a range of livelihood risks when relying on expensive inputs. In addition, institutional constraints, such as market access, could be more relevant. This thesis has shown that both the process of curriculum development and the content need greater attention.

Biophysical issues in cassava in Malawi

Pest and disease management

Classical biological control measures which proved successful in Malawi, such as the distribution of *A. lopezi* as a biological control agent for the cassava mealybug, does not require farmers' participation (Hillocks 2002b; Orr 2003; Snapp and Minja 2003; Morris 2004; Orr and Ritchie 2004). On the other hand, the commonly cited recommendation to rogue cassava (i.e., uproot and discard the plant) when the symptoms of ACMD are visible on the leaves may not be sufficient for controlling primary infestation and not applicable when farmers have alternative perceptions of pests and diseases and of their impacts (Chapter 2). Only when cassava is grown more

intensively and as a cash crop, farmers may need to give more emphasis to pest and disease management. The options in the first instance might be found mostly in the area of crop management and husbandry practices.

The diversity of traditional systems enhances natural enemy abundance and generally keeps insect pest populations at low levels. For example, traditional practices of inter-cropping in general suppress the populations of insect pests in cassava such as hornworm [*Erinnyis ello*], whitefly [*Aleurotrachelus* sp. and *Bemisia* spp.], lace bag [*Vatiga manihotae*] and thrips, as well as the incidence of diseases, including rust [*Uromyces manihotis*], bacterial blight [*Xanthomonas manihotis*] and angular leaf spot [*Isariopsis griseola*] (Leihner 1983). It also reduces the weed pressure, although the yield depends on the variety and density of the crops interplanted (Mutsaers, Ezumah et al. 1993). However, the control of ACMD and CMB in resource-poor settings requires a viable and important measure such as plant sanitation through careful selection of planting materials[45] (Peters 1994; Thresh and Cooter 2005). Because farmers may be unwilling to uproot their standing crops, plant sanitation could be achieved through careful selection of stem cuttings for recycling, rather than by roguing. Although this strategy is currently emphasised as a recommendation, it merits further verification and promotion and a much improved system for ensuring local supply of clean cuttings of the varieties locally preferred, as well as of new varieties.

Varietal issues

Persistent preference for susceptible local cassava cultivars indicates that, in the case of a subsistence food crop, farmers attach higher importance to characteristics such as palatability and cooking quality rather than pest and disease tolerance or high yield, which are the general focus of research and extension. Under these circumstances, the injury from pests and diseases may not be perceived as significant when local varieties suit the needs of local consumers and producers (Calvert and Thresh 2002; Chapter 2). The distribution of improved varieties has shown modest success, with limited adoption rates for instance of Sauti (CH 92/077), Mkondezi (Mk91/478), Maunjili (TMS

[45] Mleta, H., interview by author. 29/08/2008, Chitedze Research Station; Peters, D., interview by author. 20/11/2008, Wageningen.

91934) and Silira (TMS 60142): at 11% in Nkhotakota, Nkhata Bay and Karonga combined (Kapeya, Nyirenda et al. 2002). Even though 58% of farmers in the study area have adopted at least one improved variety, they prefer to maintain local varieties (Chapter 2). Besides, susceptibility tends to develop again after some years when the improved materials are introduced into environments with poor sanitation (Ntawuruhunga 2007).

Soil fertility management

Declining soil fertility is considered to be one of the major obstacles to cassava production in Africa. In East Africa (Fermont 2009), as well as in West Africa in Benin and Ghana, cassava is regarded by some farmers as a soil fertility regenerator (Saïdou 2006). In Zanzibar, a Farmer Research Group (FRG) included *Gliricidia* spp. trees in cassava trials (Khamis 1998), and the application of green manure and improved plant spacing were found to reduce the incidence of ACMD (Spittel and van Huis 2000). Pigeonpea has been shown to have potential in contributing nutrients and moisture to the soil (Odeny 2007) and it is grown among maize in the Southern Region of Malawi (Kamanga, Kanyama-Phiri et al. 1999). However, the component of soil nutrient management was not recognised in the cassava FFSs observed in this study.

Given that soil fertility improvements take time to show effects, a curriculum designed to be implemented over a longer period would thus have additional advantages (Bruin and Meerman 2001). The involvement of farmers in research has been emphasised in the context of soil fertility management (Kanyama-Phiri, Snapp et al. 2000; Saïdou 2006). In West Africa, the potential to improve soil fertility has been found to be closely related to land tenure systems (Adjei-Nsiah 2006; Saïdou 2006); this issue has not been explored in depth in Malawi as yet.

Institutional issues

If the FFS strategy were to be refined to suit the actual situation of cassava growers in northern Malawi, what transitions in the current provisions might be needed?

Research support

At the operational level of FFS implementation, relevant biophysical issues, such as plant sanitation through the handling of cassava cuttings, could be incorporated within the framework of FFS trials. The role of the Southern Africa Root Crops Research Network, SARRNET (based in Malawi), in the last decade or so has considerably

strengthened the capacity of the research infrastructure to support cassava-based FFS and to provide a steady flow of new materials, but this opportunity for building a 'cassava management system' has not been systematically developed. Unfortunately, tissue culture laboratories that have been developed as community-managed, district-level facilities for refreshing farmer-preferred varieties in other resource-poor settings such as northeast Brazil, Thailand, and Vietnam, remain a tool of researchers in Malawi.

Simple changes to the timing and frequency of FFS sessions might also be of benefit. Because cassava has a longer growing period than annual cereals, adjusting the frequency of the meetings from once every week to every fortnight (Bruin and Meerman 2001; Youdeowei 2004) or incorporating other crops in the curriculum would be useful and might encourage researchers to engage more actively in FFS support by being less demanding of their time and resources.

HIV/AIDS

FFSs have been especially recommended in the context of poverty and HIV/AIDS (Topouzis and du Guerny 1999; Haddad and Gillespie 2001). Using a similar principle, Farmer Life Schools (FLSs) have been implemented in Cambodia and South Africa,[46] addressing AIDS-related issues (Yech 2003; Chhaya, du Guerny et al. 2004; Swaans 2008). In Malawi, AIDS issues have been only rarely explicitly included in FFS curricula, although these topics have been addressed in other programmes in relation to environmental conservation (De Souza, Heinrich et al. 2008). International Fund for Agricultural Development (IFAD) has addressed the issue of food security in conditions of poverty and AIDS by specifically designed curriculum for FFS for example in Zambia and in East Africa (IFAD 2007). Junior Farmer Field and Life Schools (JFFLS) are specifically designed to address issues relating to the increasing number of orphans and vulnerable children due to AIDS (Djeddah, Mavanga et al. 2006). Such initiatives are supported by FAO and the World Food Programme (WFP), and they have demonstrated FFSs' potential role in reducing the stigma and discrimination associated with AIDS by re-building social capital among the affected population (FAO 2007).

[46] Bredewold., M, personal communication. 11/05/2005, Wageningen.

Natural Resource Management

The potential to strengthen support for farmer-centred research and innovation in environmental conservation as climate change effects become more frequent or intense (through investments such as FFSs) also needs to be considered (World Bank 2010). It would be helpful if agricultural policy were to support agricultural agencies (both government, private commercial, and NGOs) as well as academic and research organisations to undertake rigorous work on developing curricula that could help move small-scale subsistence, as well as commercial farming, toward water-saving, fossil-fuel energy saving, and agro-biodiversity enhancing practices and technologies. Renewed emphasis on experiential learning and farmer education in the face of probable climate change effects has been shown elsewhere to be crucial in building resilience (Ensor and Berger 2009).

Roles of women farmers

The focus of FFS should be those who are directly involved in crop management. When cassava is grown for subsistence, typically women are in charge of management and decision making. For example, women may choose to avoid growing sweet varieties in distant fields from fear of thefts (Chiwona-Karltun, Mkumbira et al. 1998; Mkumbira, Chiwona-Karltun et al. 2003). They may choose to grow susceptible local varieties alongside resistant varieties or leave the ACMD-affected leaves because these are favoured for home consumption (Chapter 2). At the time of the inventory survey in 2006, it was observed that 47% of the FFS participants in Malawi had been women. The representation of women needs to be taken into account when targeting farmers.

Prospects for commercialisation and networking

It has been suggested that IPM in Africa should concentrate on cash crops which involve pesticide use because reducing pesticide applications by IPM could enhance both market opportunities and sustainability (Orr 2003). Commercial actors could also channel and finance privatised or outsourced extension and advisory services. However, only 20% of the cassava produced in Malawi enters the market and subsistence farmers rarely see opportunities for marketing (Schouten 2003).

Incorporation of learning about and experimentation with entrepreneurship may well become a major item in FFS curricula in the future (Eenhoorn and Becx 2009). The pressure to 'join the market' is growing (World Bank 2010). Countries such as China

and Brazil have shown enormous benefits for farmers themselves as well as for local and national development of organising and educating small-scale farmers as market-oriented entrepreneurs. Africa has lagged behind in these efforts, but here too there is growing awareness of the potential for market-led growth in the small farm sector. In East Africa in particular, FFSs oriented to this agenda have been playing a pioneering role with demonstrable impact (Okoth, Khisa et al. 2003).

Cassava processing has been included in the government extension programme (Food and Nutrition Unit and Department of Agricultural Extension & Training 1998; Sandifolo and Chikopa 1999), but the effort has been focussed on the Central Region and Southern Regions in practice (Akoroda and Mwabumba 2000). In other parts of the world, the dynamic nature of the FFSs' evolution as a demand-driven process means that market access, including niche markets such as organic production (Balagopalan 2002; Hillocks 2002b), and other institutional issues related to crop management are increasingly being taken up in FFS curricula (Bruin and Meerman 2001). Promoting commercial cropping and value-addition for the market would improve cassava farmers' incentive to increase production and improve management, and thus offers a stronger motivation for their participation in FFSs.

Various ongoing initiatives for engaging farmers in networking, through capacity strengthening and the widening spread of mobile telephones, are encouraging and supporting new roles for farmers in agro-enterprise development. Private partnerships for linking farmers in Malawi to the market include paprika as an export cash crop (Donker 2006). A farmers' group in the Southern Region, with the help of external support, has organised flourishing enterprises involving cassava processing for a range of processed goods (Chiwona-Karltun, Kambewa et al. 2005). Similarly, an agro-processing group in the Central Region of Malawi sells cassava bread in the locality with the help of the government's One Village One Product (OVOP 2006) initiative. A cassava starch factory was established in 2003 in Nkhotakota with the help of the International Institute of Tropical Agriculture (IITA) in collaboration with the Southern African Root Crops Research Network (SARRNET) (IITA 2007). Examples from East Africa and Democratic Republic of Congo reflect the potential to increase local and regional demand for value-added cassava products. Such demand also clearly exists in Malawi. The farmer-initiated and managed Cassava Roots and Tubers Enterprises (based near Zomba) last year processed 500 tonnes of cassava into bread, jam, and

wine, and has recently received a US$1.3 million grant from the US African Development Fund, spread over 5 years, to build its marketing and processing capacities and expand the training of its approximately 200 members (Ngwira 2009).

However, so far the FFS stakeholders have made no links with the commercialisation agenda. There is also additional untapped potential to build marketing networks and outlets along the periodic migration routes that form a part of rural livelihood systems (Potts 2006; Chapter 4), catalysing farmers' creativity by linking producers to more distant markets (Salahuddin, van Mele et al. 2009; Van Mele 2009).

Moreover, opinion is mixed on the contribution FFS might make overall. Caution has been expressed concerning the role of IPM/FFS approaches in Malawi (Orr 2003; Orr and Ritchie 2004), on the grounds that crop protection in general, and IPM in particular, is not the primary concern of most small farmers, that the service structure does not have the capacity to support FFSs, and that larger initial gains might be secured by other means. The findings presented in this thesis would tend to support this appraisal, but they also point to opportunities where systematic FFS investments might offer significant impacts.

Looking forward: a new kind of modality

Malawi itself indeed can build on the demonstrated impact of FFSs in the Hara irrigated rice scheme in Karonga District, which has not only led to a strong yield increase in the rice crop among the graduates (Tiggelman 2009) but also supported the establishment of cooperative initiatives and farmer-owned rice mills with the help of OVOP in the area.

There are comparative advantages in theory of relying on government extension workers as the primary FFS facilitators, given their basic extension skills and field experience. However, as other countries in East Africa have experienced, constant transfers of government extension workers, many posts unfilled under budgetary constraints, and AIDS deaths, have meant that the role of farmer facilitators has become increasingly relevant. Investing in farmer facilitators, despite the fact that there is reluctance to recognise them by some participating farmers and that the farmer facilitators' livelihood is also unstable, nonetheless could be a more realistic option than relying only on government extension staff. Farmers have been recognised

as a potential asset in the discussion of scaling up the FFS experience also in West Africa (Nederlof 2006).

Experiences of self-financed FFSs in East Africa, whereby farmers cover the operational costs by selling the produce of the FFS experimental plots, suggest that issues of financial sustainability could be addressed also in Malawi (Okoth, Khisa et al. 2003). Local government support to farmer-led schools in East Africa, by complementing the farmers' financial contribution by grants to cover travel and essential materials needed for the experiments, has laid the foundation for scaling up at lower costs (van den Berg and Jiggins 2007). Such efforts typically come to be supported over time by an increasing range of civil society and church-based organisations, NGOs, and government departments, opening up new opportunities for leadership, networking, and entrepreneurship.

There is potential also for developing the use of technology-mediated knowledge platforms, such as cell phone applications, that are already used in India for crop pest monitoring (Peshin and Dhawan 2009) and other parts of Africa for disease surveillance (Rugalema and Muir 2008). The IAASTD's Global Summary for Decision Makers (IAASTD 2009), endorsed by fifty-eight governments, identifies (in option 10) remote sensing, information, and communication technologies (among other initiatives) as creating 'opportunities for more resource-efficient and site-specific agriculture' (IAASTD 2009:6) and assessment is made of other current instances in the Global report (McIntyre, Herren et al. 2009), as well as in Peshin & Dhawan (2009).

What do the findings of this thesis contribute to the current policy debate?

A weakness of FFS programmes is that, despite the investment in human resource development, a dependency on outside technical assistance remains, especially regarding research and development (R&D) and continued project adaptation. This is because dominance over R&D has remained with established research institutions, while local needs and project needs have been insufficiently addressed. Clearly, platforms of stakeholders are needed to develop knowledge in the appropriate context. Hence, the role of practitioners and other stakeholders in R&D processes needs to be increased.

Farmers themselves have shown that they are capable of doing research and adapting their practices (van den Berg, Ooi et al. 2001). Just as farmers are able to address local problems through R&D, so can practitioners (i.e., programme technical staff, trainers, facilitators) deal with problems at the programme-level. Practitioners, as programme actors, are potentially in a better position than external researchers to guide and conduct R&D at the programme level, through alliances with other stakeholders. Problems that are widespread may require that educational content is developed in the form of curricula that can be locally adapted or as guidelines that offer a range of options for development of local content and exercises. FFS programmes provide much opportunity for decentralised R&D because of the number of actors and locations involved.

Moreover, in the context of dynamic changes in the natural, social and political environment, the ability to respond adaptively becomes ever more important, and thus educating farmers in their primary occupation, so that they can participate in research and extension has been recognised as a necessity (van Huis and Meerman 1997; McIntyre, Herren et al. 2009). Investment in farmer education is seen as vital in building their resilience in the context of unforeseen climate changes with all the instability and risks that these changes entail (World Bank 2010). Adaptation to climate change needs to be addressed (Stringer, Dyer et al. 2009) within a holistic framework that includes local policies for the agricultural sector (Nelson, Rosegrant et al. 2009). It is thus ever-more important to invest in local capacity to build meaningful response by 'smarter' farmers in managing increasing volatility and variance; the more farmers understand about integrated management of agroecology, the better the decisions they will be able to make. Crop protection will become much more complex than simple treatment responses or genetic technologies, and is likely to include locally-adapted varietal selection, pest and disease identification, managing a crop for resilience, and choosing among possible management responses (e.g., roguing, soil fertility management). Under increasing frequency of natural hazards (Guha-Sapir, Hargitt et al. 2004; McIntyre, Herren et al. 2009), some of the biophysical and treatment solutions in the past may no longer be relevant. Science and government will not be able to respond in many cases quickly enough to new threats brought about by climate change (Guha-Sapir, Hargitt et al. 2004).

During the past decade, several million farmers have been trained in Farmer Field Schools (FFS) on participatory Integrated Pest Management (IPM) in Asia and Africa. The FFS empowers men and women farmers to develop adaptive crop management and to initiate their own community programs. Its participatory approaches, such as farmer-to-farmer training, action research, and policy dialogue, have the potential to transform natural, human, and social assets into a range of livelihood outcomes (Pontius 2002). The Netherlands Government has been the largest single donor of FFS programs on participatory IPM (Neuman and Mutsaers 2001).

Since the success of rice IPM, the FFS concept has been adopted for use in many other crops and into new technical domains such as plant breeding and the management of natural resources. Consequently, there is an urgent demand for new educational content. New forms of research and development are required to achieve this, as was concluded at an international workshop (CIP-UPWARD 2003). Now is the time to invest in farmer education by increased focus on training, monitoring, and backstopping of frontline extension staff, taking into account gradual losses over time to risks including AIDS.

Areas for future research

As a result of the key findings, a need for future research has been identified. In particular:

- Many of the solutions in subsistence cropping in Africa, cassava-related activity and food security in particular, involves actions which require longer term observation or experimentation until an effect is seen. How this challenge can be addressed remains to be seen.
- The smallholder agriculture sector from an enterprise management perspective calls upon a whole range of specialisations – from agronomy, plant protection, and varietal selection to entrepreneurship and marketing. Therefore, educational programmes and activities for farmers require flexible curricula. These would be easier to develop and deliver once farmers' capacities have been strengthened through adult learning approaches such as FFSs, whatever the foundation curriculum content.

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Appendices

Mwandovi village

Kachere village

Hara Irrigation Scheme


HARA WATER USERSASSOCIATION RICE MILLING PROJECT
FUNDED BY JICA (OVOP)
(CHIGAYO)


HARA WATER USERS ASSOCIATION

Summary

Malawi is one of the poorest countries in the world. It has a high population density. Most people live in rural areas and typically grow maize on a small scale as a staple food. Maize production is largely dependent on uni-modal rainfall and the availability of inorganic fertilizer. Both have been unstable, and food shortages have been a serious and persistent problem at household and national levels. Cassava has become an increasingly important crop, particularly since the late 1990s. One explanation for this, among other factors, is the loss and reduced quality of labour due to AIDS. The high prevalence of HIV has had considerable socioeconomic impact on rural livelihoods. The 'New Variant Famine' hypothesis proposes that AIDS offers a major challenge to food security in this part of Africa, driving small-scale producers away from maize to less labour-demanding but nutritionally poorer crops such as cassava. AIDS impairs the functioning of traditional support systems, leading to the collapse of 'social immunity'. This study examines the interplay between cassava cropping, livelihoods, HIV/AIDS, and Farmer Field Schools (FFS). FFSs were originally developed in Asia for farmers to learn Integrated Pest Management (IPM) strategies for crop protection in irrigated rice, by attending facilitated, season-long meetings in the field, where they learn through field observation, measurement, experimentation, agro-ecosystem analysis, and peer assessment. However, in the case of Africa, IPM/FFSs on subsistence crops such as cassava, so far have had limited impact. The history of IPM and FFSs in Malawi has not been documented in detail or comprehensively prior to this study. The research was conducted in the Chilumba area of Karonga District in northern Malawi, between December 2005 and October 2008, in a resource-poor rural area where the prevalence of HIV is relatively high. Four of the five studies comprising this research are based on three livelihood systems: a cassava-based village, an irrigated rice scheme and a control village with access to trading and fishing. The fifth, policy-oriented study investigates the history of IPM/FFSs in Malawi and critically assesses the future potential contribution of FFSs to the development of small-scale farmers' livelihoods.

Chapter 2 presents the outcome of a survey of farmers' perceptions related to the cultivation of cassava, focusing on pests and diseases. A combination of participatory research methods was used, involving 52 farmers in two cassava-based villages in Chilumba; 19 had participated in FFSs and 33 were non-participants. Cassava Mealybug (CMB), African Cassava Mosaic Disease (ACMD), and Elegant grasshoppers were the

most widely perceived production constraints. Although most farmers recognised the visible insect pests and diseases, most of them did not consider the damage serious enough to take action. The farmers had limited understanding of natural enemies and vectors. Successful biological control programmes on CMB and Cassava Green Mite (CGM) had been implemented without farmers' involvement, although CMB was still perceived by our respondents as a greatest threat. Over half of the farmers used improved varieties with higher tolerance against pests and diseases. However, cultural controls such as roguing are hardly used, mainly because controlling pests and diseases such as ACMD is not considered a priority. For both male and female farmers, participation in FFS sessions enhanced their access to improved varieties but did not have a major impact on their perceptions and control practices. A critical issue for FFSs is found to be the design of appropriate curricula in relation to the crop and to plant protection measures that farmers are prepared – and able – to take. The question of why small-scale farmers might be motivated to join an FFS in an AIDS-impacted area needs further consideration and a re-design of curricula. The actual and potential relevance of FFSs based on subsistence crops is discussed in the light of the findings.

Chapter 3 is based on in-depth repeat interviews and survey data on cropping systems with 30 respondents in three locations in rice and cassava cropping areas in Chilumba. The family trees of individuals in different livelihood systems were examined in order to explore the 'threshold of social immunity'. The level of AIDS impact was assessed for each respondent based on researcher-developed criteria, yielding three categories: those declaring themselves affected, those considered to be affected on the basis of deaths in family trees, and those reporting being non-affected. The respondents' serostatus was not further verified. The analyses of genealogical data elicited through the interviews, using Legacy software, showed the coping responses to a range of opportunities and stresses. Diversification of sources of support was found to be common among those declaring themselves to be affected; this could be read as a sign of a breakdown in extended family networks beyond the 'threshold' level and thus a further confirmation of the 'New Variant Famine' hypothesis. However, although the impact of AIDS was evident on the personal level, the findings show that, overall, the risks of exposure to HIV could be regarded as only one in a continuum of other risks. In such contexts, treating AIDS impact as the decisive factor in household coping appears overstated. Detailed study is required to understand alternative livelihood strategies in the face of multiple stresses.

Chapter 4 explores personalised geographical mobility maps based on data extracted from in-depth life history narrations with 30 respondents in three locations in Chilumba based on different livelihood systems. Based on the researcher-developed criteria, the respondents were allocated to three categories: those declaring themselves affected, those considered to be affected on the basis of deaths in the family, and those reporting being non-affected. The geographical mobility data were illustrated as maps by using Legacy software. It was observed that frequency of movement varied considerably between individuals and was not correlated with AIDS impact level, or with livelihood system or gender. One-third of all the respondents had remained in the Chilumba area for the majority of their lives. Diverse reasons for migration were recognised and were classified into six categories: guardian, education, income opportunities, marital reasons, divorce and others. The frequency and range of mobility across all three impact levels and both genders suggests unstable boundaries to notions of 'community' and poverty-driven pluri-activity as a normal response to a range of perceived and uncontrollable risks. Overall, the findings suggest that high mobility, a known AIDS-related risk, might not be the most decisive factor in terms of risk exposure to HIV. More detailed study is required to understand alternative livelihood strategies in the face of the multiple stresses identified.

Chapter 5 explores the changing perceptions of AIDS and people's responses to its impact by eliciting the life history narratives of 30 respondents. The respondents were classified by means of three variables: gender, livelihood systems, and AIDS impact levels. In the life histories, respondents reported a range of critical events that threatened their social immunity, including deaths, sicknesses, migration, marriages and divorces, and dropping out of school; i.e., a greater range of risks than AIDS alone and these need to be recognised in AIDS programming. For the respondents classified as AIDS 'affected', learning about their seropositive status was found to be an important, and in some cases a positive, turning point in their lives in terms of behavioural changes, such as joining support groups and opening up to discussion of the implications of their status. This could suggest a second lesson for public health: the strengthening of social, organisational, and personal capacities for such individuals, together with an increased access to health services, may confer a higher level of social immunity among those labelled from 'the outside' as the worst affected and least capable.

Chapter 6 assesses the relevance of IPM and FFS for small-scale farmers in northern Malawi. The data were collected by analysing an inventory survey of the Ministry of Agriculture, carrying out key-informant interviews with NGO practitioners and donors, observing cassava-based FFS sessions in Chilumba, and participating in two national FFS stakeholder workshops. The analysis of the combined information indicates that FFSs in Malawi have been treated as a variant of conventional group-based demonstration with preselected solutions to predefined problems. To meet the challenge of FFS implementation, policy reform and training of both extension staff and farmer facilitators would be required. Major constraints identified in cassava cropping have been related mostly to institutional issues such as access to improved varieties rather than to problems of low yield or pest and disease management. For that reason, a more flexible and wider focus in FFS curricula design is recommended, especially as the potential has been demonstrated elsewhere in Malawi for small-scale cassava farmers to become more market-oriented by producing a range of home- and community-based processed products for sale. This study has helped to catalyse the emergence of a national FFS platform and linked Malawian practitioners to the FFS network in East Africa.

Chapter 7 first reintroduces the overall aim and research questions of this study. Thereafter, the overall research methodology and process followed in this thesis is assessed by examining the complementarity among and limitations of each method. Based on the main findings, it then argues that the 'New Variant Famine' hypothesis needs to be nuanced by taking into account the new social networks and positive developments occurring on local level as people acknowledge their serostatus, as observed in this thesis. The interplay of AIDS impacts and responses in the context of cassava-based livelihoods challenges farmers to cope with a range of risks over their lifetime. It has been shown empirically how people are exercising their agency by building diversified livelihood strategies and responses that often involve mobility over a large geographic area. In so doing, they develop their perceptions of their livelihoods and identities and the risks they face. Finally, FFS policy in Sub-Saharan Africa is discussed, taking into account the evolution of IPM and FFSs in Malawi. Crop protection, institutional issues, and new challenges including AIDS, structure the discussion. Emerging opportunities for commercialisation and networking are recognised. Agricultural education and extension need to be strengthened to meet future challenges such as climate change. Malawi could recover and rebuild capacity at

a range of levels, even with continuing heavy losses from AIDS. The thesis concludes by identifying areas for further research, in particular to mount longer-term effort to support small scale farmers in identifying opportunities at local levels in diverse contexts and to develop FFS curricula that can meet those challenges.

Samenvatting

Bestaansmogelijkheden van cassaveboeren in de context van HIV/ AIDS in Noord-Malawi

Malawi is één van de armste landen ter wereld met een hoge bevolkingsdichtheid. De meeste mensen wonen op het platteland waar ze op kleine schaal maïs als hun belangrijkste voedingsbron produceren. Maïs productie is grotendeels afhankelijk van regenval gedurende één periode van het jaar. Daarnaast is het afhankelijk van de beschikbaarheid van anorganische meststoffen. Beide factoren zijn onzeker, en voedseltekorten zijn een serieus en blijvend probleem op zowel gezinsniveau als nationaal. Cassave is een steeds belangrijkere rol gaan spelen sinds het eind van de jaren 90. Een verklaring hiervoor is, naast andere factoren, het verlies aan en de verminderde kwaliteit van arbeid veroorzaakt door HIV/AIDS. Omdat er zoveel HIV/AIDS gevallen zijn, heeft dit een belangrijke invloed op de sociaaleconomische situatie van veel huishoudens op het platteland. De 'New Variant Famine' hypothese stelt dat HIV/AIDS een grote uitdaging vormt voor de voedselveiligheid in dit deel van Afrika, want kleine boeren worden gedwongen over te stappen van maïs naar minder arbeidsintensievere gewassen met een geringere voedingswaarde zoals cassave. HIV/AIDS belemmert de werking van de traditionele ondersteuning vanuit de gemeenschap, wat leidt tot het ineenstorten van de 'sociale immuniteit'. Dit onderzoek is gericht op de samenhang van cassave productie, levensonderhoud, HIV/AIDS en boeren veldscholen ('Farmer Field Schools' - FFS). FFSs zijn oorspronkelijk in Azië ontwikkeld voor boeren om geïntegreerde bestrijding van plagen ('Integrated Pest Management' - IPM) toe te passen als een strategie van gewasbescherming in rijst. Bij FFS komen boeren regelmatig bij elkaar tijdens het groeiseizoen en leren ter plekke veldobservaties uit te voeren, metingen te doen, te experimenteren, het agro-ecosysteem te analyseren, en geïnformeerde beslissingen te nemen. In Afrika echter, heeft IPM/FFSs tot nu toe weinig effect gehad op de productie van gewassen zoals cassave. Voorafgaand aan dit onderzoek was het niet erg duidelijk hoe IPM en FFSs in Malawi tot stand zijn gekomen. Het onderzoek is van december 2005 tot oktober 2008 uitgevoerd op het platteland van Chilumba, een gebied gelegen in het Karonga district van Noord-Malawi. Dit gebied is arm aan beschikbare grondstoffen en heeft relatief veel gevallen van HIV/AIDS. Vier van de vijf studies zijn gebaseerd op onderzoek in drie dorpen waar mensen verschillende strategieën van levensonderhoud hebben: een

dorp grotendeels afhankelijk van cassave, een dorp afhankelijk van geïrrigeerde rijstteelt en een controle dorp met toegang tot visserij en handel. De vijfde studie is een beleidsgericht onderzoek naar de geschiedenis van IPM/FFSs in Malawi. Hierbij wordt kritisch geëvalueerd wat de toekomstige mogelijkheden zijn van FFSs in de verbetering van de levensomstandigheden van de kleine zelfvoorzienende boer.

In hoofdstuk twee worden de resultaten weergegeven van het onderzoek naar de perceptie van boeren voor wat betreft zowel het telen van cassave als de ziekten en plagen van dit gewas. Een combinatie van participatieve onderzoeksmethoden werd gebruikt voor het onderzoek waarbij 52 cassave boeren waren betrokken uit twee dorpen in Chilumba. Van deze groep namen 19 personen deel aan FFSs en 33 niet. De wolluis "Cassava Mealybug' (CMB), het virus 'African Cassava Mosaic Desease' (ACMD) en de sprinkhaan 'Elegant Grasshopper' werden als de meeste belangrijke ziekten en plagen beschouwd. Hoewel de meeste boeren de waarneembare ziekten en plagen kunnen identificeren, wordt de toegebrachte schade niet belangrijk genoeg geacht om ze te bestrijden. De boeren hadden weinig idee van natuurlijke vijanden en van insecten die ziektes kunnen overbrengen. De zeer geslaagde klassieke biologische bestrijding tegen CMB en 'Cassava Green Mite' (CGM) gebeurde zonder de betrokkenheid van boeren. Echter, CMB wordt nog steeds gezien als de grootste bedreiging door de geïnterviewde boeren. Meer dan de helft van de boeren gebruikt verbeterde variëteiten, die verhoogd resistent zijn tegen ACDM. Maar, sanitaire maatregelen zoals het verwijderen van aangetaste planten in het veld worden bijna niet toegepast omdat boeren het niet als een belangrijk probleem ervaren. Voor zowel mannelijke als vrouwelijke boeren, heeft het deelnemen aan FFS de toegang tot nieuwe variëteiten vergroot. Het heeft echter nauwelijks invloed gehad op hun mening over de uit te voeren bestrijdingsmethoden. Een belangrijk maar moeilijk punt voor FFSs is het opstellen van een curriculum met betrekking tot methoden van productie en gewasbescherming, die boeren niet alleen kunnen, maar ook bereid zijn te nemen. De vraag waarom kleine boeren ervoor kiezen om zich aan te sluiten bij een FFS in een gebied met veel gevallen van HIV/AIDS moet verder worden onderzocht en zal waarschijnlijk leiden to het herformuleren van het curriculum. Het feitelijke en potentiële belang van FFS's voor gewassen die gebruikt worden voor zelfvoorziening wordt bediscussieerd aan de hand van de resultaten.

Hoofdstuk 3 is gebaseerd op herhaalde diepte-interviews met 30 respondenten in drie locaties waar cassave en rijst wordt verbouwd in Chilumba en op gegevens verkregen over hun teeltsystemen. De familiestambomen van boeren met verschillend vormen van levensonderhoud werden onderzocht om de drempel van sociale immuniteit te bepalen. De mate waarin respondenten zijn getroffen door HIV/AIDS werd bepaald door zelf criteria te ontwikkelen. Dat resulteerde in drie categorieën personen: mensen die verklaarden wel (1) of niet (2) getroffen te zijn, en mensen (3) die veronderstelden getroffen te zijn op grond van overleden familieleden. De serostatus van de respondenten werd niet verder gecontroleerd. De analyse van genealogische data ,verkregen uit de interviews door gebruik te maken van de Legacy software, gaven een reeks van strategieën aan om enerzijds in te kunnen springen op kansen en anderzijds bedreigingen het hoofd te kunnen bieden. Verschillende vormen van ondersteuning werden gevonden door hen die verklaarden getroffen te zijn door HIV/AIDS. Dit zou kunnen worden opgevat als een teken dat het uitgebreide familienetwerk op een zeker moment niet langer meer als vangnet functioneert en dat zou een bevestiging kunnen zijn van de 'New Variant Famine' hypothese. Echter, hoewel het effect van HIV/AIDS op persoonlijk vlak duidelijk was, tonen de resultaten aan dat HIV/AIDS als één van de vele risico's wordt beschouwd. In deze context wordt het effect van HIV/AIDS als de cruciale factor in huishoudens overschat. Een gedetailleerde studie is nodig om de strategieën van levensonderhoud te begrijpen in relatie tot de vele risico's die men loopt.

Hoofdstuk 4 verkent de persoonlijke geografische mobiliteitskaarten gebaseerd op gegevens verkregen door de levensverhalen op te tekenen van 30 respondenten uit drie verschillende locaties in Chilumba en die op een verschillende manier in hun levensonderhoud voorzien: zij die verklaren wel (1) of niet (2) getroffen te zijn door HIV/AIDS en zij die veronderstellen getroffen (3) te zijn op grond van overleden familieleden. De geografische mobiliteitsgegevens werden geïllustreerd door kaarten gegenereerd door de Legacy software. Uit de gegevens bleek dat de mate waarin werd verhuisd sterk verschilde per persoon en het was niet gecorreleerd aan de mate waarin men te maken had met HIV/AIDS, aan het geslacht of aan het type levensonderhoud. Een derde van de respondenten heeft voor het merendeel van hun leven altijd in de Chilumba regio gewoond. Verschillende redenen voor verhuizing werden genoemd, te categoriseren als volgt: zorg voor familieleden, onderwijs, bron van inkomsten, huwelijk, scheiding en andere. De mate en aard van mobiliteit over de

drie niveaus van door HIV/AIDS getroffen zijn en over geslacht, suggereren dat er geen duidelijke grenzen zijn over wat men onder gemeenschap verstaat. Door armoede gedreven zijn de vele activiteiten die men ontplooit een normale reactie op de waargenomen en onverwachte risico's. De resultaten laten in het algemeen zien dat de hoge mobiliteit, een bekend HIV/AIDS gerelateerd risico, niet de meest cruciale factor hoeft te zijn bij blootstelling aan dit risico. Een meer gedetailleerd onderzoek is nodig om de strategieën van levensonderhoud te begrijpen wanneer men aan vele problemen wordt blootgesteld.

Hoofdstuk 5 probeert te achterhalen of de ideeën over de invloed van HIV/AIDS op de samenleving zijn veranderd door 30 respondenten hun levensverhaal te laten vertellen. De analyse werd gedaan door respondenten te verdelen naar geslacht, type levensonderhoud en de mate van getroffen zijn door HIV/AIDS. In de levensverhalen, werden een reeks gebeurtenissen beschreven, die bedreigend waren voor hun sociale immuniteit zoals ziekte en dood, verhuizing, huwelijk en scheiding, en het voortijdig verlaten van school. Dus ook andere risico's dan HIV/AIDS werden benoemd, die van belang kunnen zijn bij een behandeling van de ziekte. Respondenten die het meest getroffen zijn door HIV/AIDS, bleken te leren van hun seropositieve status. In sommige gevallen was dit een belangrijk omslagpunt in hun leven, omdat ze positief mee gingen doen aan steungroepen en een openlijk de discussie aangingen over de gevolgen van hun status. Dit kan wijzen op een belangrijke les voor de publieke gezondheidszorg namelijk dat het mogelijk is sociale immuniteit te verhogen van personen die van buitenaf worden gezien als de meest getroffen en minst bekwaam, namelijk door hen toegang te geven tot diensten waarbij hun sociale, organisatorische en persoonlijke capaciteiten worden vergroot.

Hoofdstuk 6 beoordeelt de relevantie van IPM en FFS voor de kleinschalige zelfvoorzienende boeren in Noord-Malawi. De gegevens zijn verzameld door: een enquête hierover van het Ministerie van Landbouw te analyseren, door sleutelfiguren bij NGO's en donoren te interviewen, door de gang van zaken in FFS in cassave in Chilomba te analyseren, en door deel te nemen aan twee nationale FFS conferenties. De analyse van deze informatie geeft aan dat FFSs in Malawi kunnen worden beschouwd als een variant van conventionele voorlichting waarbij kant en klare oplossingen voor problemen - door deskundigen geformuleerd - worden gepresenteerd. Om FFS werkelijk in te voeren zodanig dat het aan de verwachtingen

kan voldoen, verreist een verandering van beleid en een intensieve training van voorlichters en moderatoren van FFS. De grote problemen die werden geconstateerd in de cassaveteelt zijn vooral gerelateerd aan institutionele problemen zoals de toegang tot verbeterde rassen in plaats van problemen van lage opbrengst of die van ziekten en plagen. Daarom wordt een bredere en flexibele focus in de curricula van FFS aanbevolen. Dit is met name belangrijk wanneer het mogelijk wordt, zoals in andere gebieden van Malawi, om de kleinschalige zelfvoorzienende cassaveboeren meer marktgericht te maken, waarbij producten door de lokale gemeenschap bewerkt op de markt kunnen worden gebracht. Deze studie heeft geholpen om de opbouw van een nationaal FFS platform te versnellen en het Malinese FFS netwerk te verbinden met die van Oost- Afrika.

Hoofdstuk 7 begint met de herintroductie van het doel en de onderzoeksvragen van dit onderzoek. Daarna worden de onderzoeksmethode en het proces dat gebruikt is, geanalyseerd door de complementariteit en de beperkingen van elke methode onder de loep te nemen. Gebaseerd op de belangrijkste bevindingen wordt dan beargumenteerd dat het nodig is om de 'New Variant Famine' hypothese te nuanceren door in aanmerking te nemen dat er nieuwe sociale netwerken en positieve ontwikkelen gaan ontstaan zodra mensen hun seropositieve status erkennen, zoals waargenomen in dit onderzoek. De wisselwerking tussen het effect van HIV/AIDS en de reactie daarop in de context van een levensonderhoud gebaseerd op cassave daagt de boeren uit om een antwoord te vinden op een reeks risico's gedurende hun leven. Het is empirisch aangetoond dat mensen hun capaciteit gebruiken om een strategie te ontwikkelen die tot doel heeft om op verschillende manieren in hun levensonderhoud te kunnen voorzien en vaak brengt dat mobiliteit mee over een groot geografisch gebied. Op deze manier neemt de bewustwording toe van hun bestaansmogelijkheden, van hun identiteit en de risico's die ze lopen. Als laatste, wordt het FFS beleid in Afrika ten zuiden van de Sahara bediscussieerd, in aanmerking nemende de ontwikkeling van IPM en FFSs in Malawi. Gewasbescherming, institutionele vraagstukken en nieuwe uitdagingen inclusief HIV/AIDS, bepalen de structuur van de discussie. Nieuwe mogelijkheden voor commercialisering en netwerken worden benadrukt. Agrarisch onderwijs en voorlichting moet worden versterkt om toekomstige uitdagingen zoals klimaatverandering te kunnen weerstaan. Malawi kan zich herstellen en dient de capaciteit op een aantal niveaus opnieuw op te bouwen, zelfs al eist HIV/AIDS in de toekomst nog veel slachtoffers. Het proefschrift besluit met het identificeren van

gebieden voor verder onderzoek, in het bijzonder een lange termijn planning voor het helpen van kleine boeren om lokaal nieuwe kansen te vinden op verschillend gebied en het ontwikkelen van FFS curricula om deze kansen te benutten.

NKhani Mwakudumula (Summary in ChiTumbuka)

Umoyo wa balimi wa mayawo nakukolerana kwa ulimi uwu na HIV/AIDS

Chalo cha Malawi ni chimoza mwa vyalo vikavu chomene mchalo chapasi. Banthu wakukhala mwa kufyenyana malo, ndipo wanandi wakukhala mkaya, nakugomezga minda ya ngoma yichoko yichoko pa umoyo wawo. Vula yikuwa kamoza pa chaka kweniso yikukhumba feteleza nyengo yose. Suzgo la chakulya laba lakulutilira chifukwa vula na kasangikiro ka feteleza nkhakusuzgirapo. Mbuto ya mayawo yawa ya kugomezgeka kufuma vyaka vya mma 1990. Masuzgo agha yiza chifukwa cha nyifwa na kusobelwa kwa umoyo uweme chifukwa cha HIV/AIDS. Kufala kwa thenda ya HIV/AIDS kwiza na suzgo mu kasakatilo na kakhaliro ka banthu mmizi. 'New Variant Famine' nisachizgo iro likuti HIV/AIDS yiza na masuzgo yakulu ya njala muno mu Afirika, cheneicho chikupangiska balimi bachoko bachoko kuleka kulima ngoma nakwamba kulima mbuto izo nzipusu kulima, izo kanandi zikuwa zambura vyakwenerera vyakukhumbikira m'mathupi kuti awe a kutchintha, yimoza mwa mbuto izi ni mayawo. HIV/AIDS yikutimbanizga umoza uwo wukuwa pakati pa banthu mukuvyirana mthowa zakupambana pambana, icho chikupangiska banthu mkaya kutondeka kuvyira bakukomwa nawuluwali. Kafukufuku uyu wawunikira kukolerana kwa ulimi wa mayawo na, umoyo wa banthu, HIV/AIDS, Kweniso busambiri wa pamunda FFS. Busambiri wa pamunda FFSs wukayambira ku vyalo vya ku ulaya na chilato chakumazga tivibungu twa m'mbewu mu nthowa zakupambanapambana, 'Integrated Pest Management' IPM, nachanduro cha kuthaska mpunga wamunthilira kujumpha mu busambiri wa pamunda, maungano ya pamunda munyengo ya ulimi, kuwoneska nakupulikiskanga nyengo nanyengo ivyo vikuchitika pa munda, kupima ivyo vyakwenelera kupima, kuya na kafukufuku, kweniso kuba na ching'anamuliro cha kukorelana kwa ulimi na chilengiwa 'agro-ecosystem' nakuba nachipimo cha kamanyiro ka nthowa iliyose. Kwene mu Afulika, kasamaliro ka vibungu vya mbuto 'crop pest' mu nthowa zakupambanapambana msukulu za paminda IPM/FFSs, chomenechomene mu minda ya mbewu yakulimika nachilato chakulya nge mayawo, kandalongole vipambi pakhe uweme uliwose yayi. Mbiri ya IPM na FFSs mu chalo cha Malawi, yikawunikika vibi yayi apo kafukufuku uyu ukayambanga. Kafukufuku uyu akachitika kumpoto kwa chalo cha Malawi, mboma la Kalonga ku Chilumba pakati pa mwezi wa Disembala, mchilimika cha 2005 na mwezi wa Okutobala mchilimika cha 2008. Kafukufuku uyu akachitika ku ma banja agho mba kusoberwa Kweniso bali

mchikaya icho HIV/AIDS njakufalikira chomene. Mitu yinayi ya visambizgo vinkhondi vya kafukufuku uyu vikufuma pa thowa zitatu zakawiro ka umoyo wa Banthu 'livelihood systems', muvikaya ivyo vikugomezga mayawo nge chakulya cha sima, kumunda wampunga wagulu uwo ngwa nthilira na kumuzi umoza wakuyaniskirapo pakafukufuku uyu, muzi wene uyu banthu banji wakumanya kukola somba na kupanga malonda mkakhaliro kawo ka zuwa na zuwa. Mutu wa chinkhonde, ukuyunika mwakuyana na kakhumbiro ka boma mukatukuliro ka ulimi, mutu uyu ukuyunika mbiri ya IPM mu ma agha FFS m'Malawi, Kweniso uku pima phindu la FFS mu umoyo wa balimi wachoko wachoko agho bakulima nachilato cha kulya.

Chigawa chachichiwiri chikuphala ivyo kafukufuku alikusanga kufuma kubalimi pa umo wakawuwonera ulimi wamayawo chomenechomene mukulawiska tuvibungu na matenda. Nthowa zakupambana pambana za kafukufuku wakuchita pamoza mwapagulu 'participatory research method' zikagwiriskika tchito. Mkafukufuku uyu mukawa balimi 52 kufumila mu mizi yiwiri yaku Chilumba iyo yikugomezga mayawo nge chakulya cha sima; 19 mwa balimi awa bakatolapo chigawa mu FFS, 33 wakatolapo chigawa yayi. Nyinda za mayawo 'Cassava Mealybug' CMB, matenda ya kodikodi 'African Cassava Mosaic Disease' ACMD mphazi 'Elegant grasshoppers' vikasangika kuwa vilwani vikulu vya ulimi. Banji mwabalimi wakamanya kuti tuvibungu na matenda yalimo m'munda kweni wakuvitora ngeti nisuzgo likulu yayi kuti waliyanayanire thowa zbakulimazgara kuti waponoske mbuto m'munda. Balimi wali na umanyi uchoko wa tuvibungu na vyakumera vya m'thondo ivyo vikutchimbizga panyake kurya tuvibungu uto tukunanga mbuto m'munda 'Natural enemies' na tuvibungu uto tukutandazga matenda. Kasamalilo ka mbewu pakugwiritsa nthito vyamoyo 'biological control' yikakafiskika makola kwambula balimi kutolako lwande, nangauli CMB kutoleka nipera kuwa mulwani mkulu pa ulimi uwu wa mayawo. Kujumpha theka la balimi likugwiriska ntchito mbuto za sono izo zikutchintha ku tuvibungu namatenda, nangauli vilintheula, kapwererero ka mbeyu mkulondezga ndondomeko yakalimiro, nge kuzgulira thondo, vikuchitika yayi, chifukwa chakuti kumazga matenda nge ACMD chikutoleka chakukhumbikira vibi yayi. Mwakulingana na umo banakazi na banalume wakaghowoyera busambiri wa pa munda FFS, yikawavyira kusanga wovwiri wa mbuto za sono kweni yikasintha viwi yayi mkayanayaniro kawo pa kapwerelero ka mbewu ku matenda. Khani yikulu mu busambiri wa pa mundaya sangika kuwa kukhumbikwa kwa kunozga ndondomeko yavisambizgo yiweme yakukhwaskana na ndondomeko ya kaponoskero ka vyakumera na mbewu, iwo balimi

mbakunweka kuyipokerela. Nkhani yakukondweska yawaso yakuti balimi wachoko wachoko bangawa wa kunweka kutolako lwande. Pafumbo iro lingawapo lakuti ntchivichi chingapangiska balimi wachoko wachoko kutolapo lwande ku busambiri wa pa munda FFS mu vikaya ivyo wanandi banji bana HIV/AIDS, likukhumba kusandasanda nakuyiyanayanira makolako, yikukhumbikaso kupanga ndondomeko yiweme ya usambiri wa pamunda. Kukhumbikwa na uweme uwo ungasangika kufuma mu FFS chomenechomene kufuma ku mbuto izo chilato chake nikulya yadumbika mwakulingana na ivyo kafukufuku walikusangira.

Ndime ya chitatu yikufuma pa mafumbo agho yakafumbika mwakuwerezgawerezga kubalimi Kweniso ndime iyi yikupangikaso kufuma ku ivyo vikasangika pa kafukufuku wa kukhwaskana na kapandiro ka mbuto 'Cropping System', mafumbo agha yakafumbika kubalimi 30 wa ku chilumba awo akufuma mmadera yatatu agho wbakulima mpunga banji mayawo. Ndondomeko iyo yikulongosola ubari nakakuliro ka banja 'family tree' ya waliyose mwakulingana na kasangiro kawo mwakupambana pambana yikawunilika, nachanduro chakusanga apo banthu wamubanja na mchikaya chose akamba kutondeka, kupwelelera agho wakawa na HIV/AIDS. Unandi wa HIV/AIDS ukapimika kwa waliyose uyo wakafumbika, chipimo cha unandi uyu chikawikika mwakulingana na umo mwene uyo wakupanga kafukufuku wakayanayanira, chipimo ichi paumaliro chikawa na vigawa vitatu: agho wakaphala kuti mbakukhwaskika na matenda ya AIDS, agho wakalongoleka kuwa akukhwaskika kufuma 'family tree', na agho akapanikizgika kuwa wambula kukhwaskika na AIDS. Ndopa za banthu agha zikapimika yayi mkukhozgera chipimo cha kwamba. Nyengo ya kafukufuku, khani ya kukhasyana na mbiri ya banja la munthu na ndopa yakhe, 'genealogical data' iyo yikatoreka pa nyengo iyo balimi wakafumbikanga mafumbo, yikawunikika pakugwiriska ntchito pologiramu ya pa komputa ya kuchemeka 'Legacy software' ivyo yikutandawurila vikalongola kuti mazgolo ya iwo banthu wakaphalanga kuti wanamwawi wukulu wakunozgera umoyo wawo kweneso mbakuzingiziwa na namasuzgo yakupambanapambana. Kukasangikaso kuti agho akamanya kuyowoya kuti a namatenda ya AIDS akawa na nthowa zinandi zakusangira wovwiri. Ichi chigawa chimanyikwiro cha kupalanyikana kwa banja nawabali banji agho akhalanga pakumoza kuyambiro, kwene yalikujupha mligo uwo angakhalira ntheura, Ichi chikukhozgera fumbo la kafukufuku 'hypothesis' la 'New variant famine'. Nanga uli suzgo la HIV/AIDS likamanyikwa pakwelu kwa yose uyo wakawa nalo, kafukufuku uyu wakasangaso kuti kofya kwa HIV/AIDS kungatoleka kuti ni kumoza na maunonono agho munthu wa

HIV/AIDS wakusangana nawo. Ntheura, kumazga matenda agha pa kuyanayanira suzgo pa banja kungawa kwa kuyiyanayanira mwakujumphizga. Nkhwakukhumbika kafukufuku ugho angamanya kuvwira kusanga nthowa zakupambana pambana izo banthu bangavyirika nazo panyengo iyo basangika na masuzgo yakupambanapambana.

Chigawa chachinayi chikulongola nthowa na mendelo 'geographical map' kufumira mu kafukufuku wakuya wa mbiri ya umoyo wa munthu waliyose wa banthu 30 agho bakufumira mmadera yatatu ya mu Chilumba. Thowa izo zilikalongoleke mwakulingana na kakhaliro ka umoyo wawo 'livelihood system'. Banthu, bakafumbika za umoyo wawo kufumira pa nyengo ya kubadwa kufikira nyengo ya kafukufuku. Mwakulingana na umo wakayanayanira mwene wakupanga kafukufuku, banthu agho akafumbika wakagawika mmagulu atatu: Agho akajiphala kuti mbalwali, agho akayanayanilika kuti mbalwali malingana na nyifwa mzinyumba zawo, na wanyake agho akaphalilika kuti walijei HIV/AIDS. Nthowa na mendelo yawo ya panyumba yikalongoleka nakujambulika 'map' pakugwiriska ntchito 'computer' na 'programme' yakumanyikwa kuti 'Legacy software'. Vikalongoleka pa 'map' agha kuti unandi wa mendelo ukapambananga chomene pa munthu unji na unji ndipo pakawavya kukolerana kulikose pakati pa unandi wa banthu na HIV/AIDS pakayavyaso kukolerana kuli kose na kakhaliro na umoyo wawo, panyakheso kuti unji nimwanalume panyakhe mwanakazi 'genda'. Banthu wakukwana chigawo chimoza mwa vitatu 'one-third' wakakhalilira ku chilumba kuti wamanye kupwelera ma umoyo yawo. Vifukwa vyakupambaniska mendero yawo vikasangika na kuwikika mmagulu yankhonde na yimoza: mpapi 'guardian', masambiro, mwawi wakasakatiro, nthengwa, kupalanyika kwanthengwa na vinyake. Mendero ya pafupi pafupi na kutalika kwa maulendo agho mu vigawa vyose vitatu ivyo vikawa vyakukhumbika mukafukufuku uyu 'impact levels', ku banalume na banakazi vikulongola kuti kayanayaniro ka banthu mvikaya kakusintha Kweniso zitchito zakupambana pambana izo zikuchitika chifukwa cha ukavu, zikuwako chifukwa cha masuzgo yakupambana pambana agho ya pamoyo pawo agho angakanizgika kuwako yayi. Ntheula, paumaliro mwakulingana na kafukufuku tingaghowoya kuti maulendo yatali yakuchitika pafupu pafupi, pakhe thowa izo zikuvwira kutandazga HIV/AIDS, vingawang ivyo pera yayi vyakukhumbika kuviyanayanira chomene kunkhani ya katolero ka HIV/AIDS. Pakukhumbikira chomene kafukufuku mkulu kuti tipurikiske thowa zinyake izo tingalondezga mu umoyo withu uyu wa masuzgo yakupambanapambana.

Chigawa cha chinkhonde, chalawiska umo kayanayaniro ka banthu kakusinthiranga pa nkhani ya HIV/AIDS, na umo kakhaliro kawo kasinthira chifukwa cha HIV/AIDS, pakufwasa nakutandaulira mazgoro agho banthu makumi yatatu akazgora. Banthu awa akawikika mmagulu mwakulondezga vinthu vitatu ivi: uwanalumi na uwanakazi 'Genda', kakhaliro mukasakatiro mu umoyo, kweneso na unandi wa ulwilwi wa HIV/AIDS kwa munthu. Kufuma mu mbiri ya munthu yekha na yekha, tunandi twakuchitika uto tukukhozgera kupasuka kwa kachinthiro kachikaya kumatenda 'social immunity' tukavumbuluka: ziyifwa, uluwali, maulendo yatali yatali, zinthengwa na kupasuka kwa zinthengwa, kulekera sukulu panthowa; i,e a kachitiro, kakhaliro, navinandi vyakofwa muumoyo wa banthu mukusazgirapo pa HIV/AIDS, vene ivi vikwenera kuviyananira mukulibana na HIV/AIDS. Ku gulu iro likatoleka kuwa 'lakukhwaskika' chikawa chakukondwesa kumanya kuti wanachibungu ka kwambiska matenda ya AIDS, kuwanyake chawanga chiweme kumanya ntheura, yawanga nyengo iyo iwo wasinthiranga kakhaliro ka moyo wawo wa zuwa na zuwa, 'behavioural change', banji watolangako lwande ku mangulu ya banthu agho wanakachibungu, 'support groups' nakamasukanga ku dumba vya masuzgo na ulwilwi wa HIV/AIDS. Kachitiro aka tingakatora kuwa visambizgo vyachiwiri vya umoyo uweme wa banthu: vyakholeskanga kukolerana pakati pa banthu na usambizgi kwa umo na umo, kuvyira kuwa na wovwiri wa vyaumoyo wambura kusuzgikira, icho chingapereka umoyo nakachinthiro chomenechomene kufuma ku banja nabanthu mchikaya ku agho awoneka kuti mbakukhwaskika chomene Kweniso mbakusowerwa chomene.

Chigawa cha chinkhonde na chimoza chikuyunika kukhumbika kwa IPM na FFS kwa balimi wachoko wachoko wa mchigawa cha kumpoto kwa Malawi agho bakulima kuti balyenge. Fundo 'data' zinandi pa nkhani zirilikuprikika na kupanizgika makora kufuma mu kafukufuku 'inventory survey' uwo akapanga wa unduna wazaulimi, Kweniso pakufumba mabungwe agho nga boma yayi NGO na agho akupereka wovwiri wakupambana pambana 'donors' mafumbo agho akawa akuvyira kumanya vinthu vyakwenera kuvimanya mwa kudankha, 'key informant interviews', Kweniso kufuma mukasambiliro ka umo ma FFS chomemene agho bakulima mayawo ku Chilumba akuchitiranga zuwa na zuwa, Kweniso pa pakuwapo pa ma ungano yawiri ya chalo chose ya banthu agho akukhwaskika oro kutolako lwande kuti ma FFSyaweko Kweniso kuti yayende akola. Mukung'anamulira khani yose yakumanyikwa mthowa zakupambana pambana za FFS, tingaghowoya kuti ma FFS mchalo cha Malawi chatoleka yakuwa nge ni FFS yakusinthika, yakupambana na umo ma FFS yakuwira,

'modified FFS', chifukwa ya na masuzgo na mazgoro kale agho yalikulembeka mu buku la ndondomeko ya masambiro yawo. (Mu FFS, balimi wakwenera kusanga masuzgo na mazgoro yake pa munda). Kuti titonde masuzgo agho yakusangika na FFS, kukhumbenge kunozgaso chirato na ndondomeko ya boma 'policy reform' na kuwasambizga walangizi waboma 'extention workers' na wasambiski agho akuwa lumoza na balimi pamunda 'farmer facilitators'. Masuzgo yakulu pa ulimi wa mayawo yasangika kuwa yakukhwasana na kutukura ulimi ngeti kubalimi kuwa na mwawi wa kusanga mbuto zamakono za mayawo, kuluska masuzgo ya matenda na kuchepa kwa vuna. Chifukwa cha ichi ntchakwenelera kuwoneskeska chomene nakupanga ndondomeko yamasambiro ya FFS, chomenechomene chifukwa sukulu yinyake ya FFS mu Malawi yirikulongora kuti balimi wachoko wachoko agho bakulima mayawo kuti walwenge, mthazi batilimenge kuti bachitenge malonda, watipangenge vinthu vyakupambana pambana kufuma ku mayagho kuti vikaguliskike. Kafukufuku uyu wavyira kukhozgera nakutukura FFS iyo yikwamba waka m'mchalo cha Malawi, kweneso yavwira kuti FFS yaku Malawi yimanyikwe na kugwira chito na ma FFS ya kumayiko yak u dera iro kukufumira ya zuwa ya chalo cha Afurika.

Chigawa cha chinkhonde na chiwiri, Chikulandulaso chanduro na mafumbo agho kafukufuku wakukhumba kuzgora. Kufuma apo kafukufuku uyu wapangikira na vyose vyachitika mkafukufuku uyu vyalawiskikaso makola 'assessed', chomemene pa kuwona ivyo vyafiskika pakati pa vyakutondeska vinandi. Mwakulingana na vikuluvikulu ivyo kafukufuku walikusanga, tingaghowoya kuti, fumbo lakafukufuku 'hypothesis' iro likuchemeka kuti, 'New variant famine' likwenera kuzgoreka mwakufwasilira nakulongosola chomeneko mwakuyanayanira kakolerano ka wanthu na vitukuko ivyo vikuchitika mkaya panyengo iyo wanthu wazomelezga nakukhutira kawiro ka ndopa yawo nge na umo vyadumbikirika mu kafukufuku uyu. kasinthiro mukhaliro na kachitiro ka vinthu chifukwa cha nthenda iyi, vikundokeska chomemene balimi agho akudalira mayagho pa umoyo wawo kuti wamanyi kutonda vinthu ivyo vingawa vyakofya ku umoyo wawo. Vyawoneka kufuma mukafukufuku umo banthu wakuyezgera kuchita udindo wawo pakunozga thowa zakupambana pambana zakuvyira kupwelerela kakhaliro na umoyo wawo Kweniso kasinthiro ka kakhaliro na kachitiro ka vinthu nge kwenda maulendo yataliyatali. Pakuchita ichi wakulongola umo kakhaliro na umoyo wawo akuyuwonera, Kweniso kupanga kakhaliro ako kangalongosola umoyo wawo na visuzgo vyakofya umoyo wawo ivyo akusangana navyo. Paumaliro, ndondomeko ya boma mukayendeskero ka FFS mu vyalo ya

kumwera kwa Chipalamba cha Saharan yalandulika mwakuyanayanira miziro ya IPM na FFSs m'Malawi. Kapwerelero ka mbewu m'minda, khani zakukhwaskana na mawupu, navisuzgo vyose ivyo vikwiza na HIV/AIDS, fundo zene izi na vindumbirano vyake. Mwawi uwo ukwiza sono wa chitukuko cha malonda na kagwiliro ka ntchito ya chitukuko m'magulu ngwakumannyikwa. Visambizgo vya balimi vikwenera kunozgeka kuti vimanye kutonda masuzgo agho yangiza chifukwa cha kusinthazi kwa nyengo 'climate change'. Malawi wangakufumamo m'masuzgo nakutchintha na nkhongono zakupambana pambana nanga wuli HIV/AIDS yikulutilira. Paumaliro kafukufuku uyu walikusanga vigawa ivyo vikukhumbikaso kafukufuku, chomenechomene mchigawa chakutukura balimi wachoko wachoko kuti wamanyenge mwawi wakupambana pambana uwo balinawo mvikaya, na kunozga ndondomeko ya masambiro ya FFS iyo yingamazga masuzgo yene agho yalipo.

要約（Summary in Japanese）

マラウイ北部における HIV エイズ影響下のキャッサバ農家の社会的生活環境

マラウイは世界最貧国の一つである。過密な人口密度のため、人口の殆どは農村地域において主食であるメイズを小規模で耕作している。メイズの生産高は、年に一回の雨季と無機肥料の供給により大きく左右されるが、その双方ともに不安定であるため、世帯レベルのみならず国家レベルでの慢性的かつ深刻な食糧不足状態が続いている。そのような状況下で、特に 1990 年代後半より、キャッサバの作物としての重要性が高まってきている。この変化に関する要因の一つとして、食糧生産に関わる労働力不足、及びその質の低下が指摘されている。このように、HIV 感染率の高さは、農村部での社会的生活環境に対して、計り知れない社会的・経済的影響を及ぼしている。「New Variant Famine」仮説は、エイズはアフリカの当該地域における食糧安全保障に対する大きな問題であり、小規模生産者は、メイズからキャッサバのようにより労働力を必要とせず栄養価が低い作物に移行しつつあると主張した。HIV エイズにより、伝統的な扶助制度の機能が衰え、「社会的免疫力」の崩壊が起きる。本研究においては、キャッサバ生産、社会的生活環境、HIV エイズおよび農民現場学校（Farmer Field Schools）といった要素の相互作用について調査した。農民現場学校は、アジアにおける稲作に由来し、農民が 総合的病害虫管理（Integrated Pest Management）や作物保護に関する理解を深められるように開発された。農民は、圃場（水田）においてファシリテーターが一耕作期間を通じて行う会合に参加し、それを通じて、実地における観察、測定、実験、農業生態系分析（agro-ecosystem analysis）および相互評価を自ら経験することによって、学習することを意図している。しかしアフリカにおいては、総合的病虫害管理や農民現場学校は、キャッサバのような自給用作物に対してはこれまであまり効果がないとされてきた。また、本研究以前は、マラウイにおける総合的病虫害管理及び農民現場学校の経緯は、詳細・包括的に記録されていなかった。本研究は、マラウイ北部のカロンガ県チルンバ地域において、2005 年 12 月から 2008 年 10 月にかけて行われた。この地域は資源の乏しい農村部で、かつ HIV 感染率が比較的高いとされている。5 つの研究のうちの 4 つに関しては、チルンバ地域の社会的生活環境の異なる 3 地区にて行われた。1 地区は主としてキャッサバ生産を行っている村、もう 1 地区は灌漑稲作施設のある地区、更にもう 1 地区は交易や漁業も営んでおり、FFS が実施されたことのない対照村である。第 5 の政策に関する研究においては、マラウイ全体における総合的病虫害管理および農民現場学校の背景経緯に関して調査し、小規模農民の社会生活環境に対する農民現場学校の潜在的寄与についての批判的評価を行った。

第 2 章では、キャッサバの耕作に関連した、特に病虫害に特化した農民の意識調査の結果について報告した。調査は幾つかの参加型手法を用いて、52 名の農民（うち 19 名は農民現場学校の参加者であり、33 名は非参加者）を対象に行われた。最も多く挙げられた生産上の問題と認識されていたものは、キャッサバ・コナカイガラムシ（CMB）、アフリカ・キャッサバモザイク病（ACMD）およびエレガンスミヤビイナゴであった。殆どの農民は、

目視できる病虫害を認識していたが、その多くは対策をとる必要性があるほど被害を深刻と捉えていなかった。また、天敵や媒介昆虫についての農民の知識は乏しかった。当該地域ではキャッサバ・コナカイガラムシやキャッサバ・ハダニ（CGM）に対しては、生物的防除プログラムが、農民を巻き込むことなく過去に実施されていたが、コナカイガラムシは依然として本研究に参加した農民にとっての最大の脅威と捉えられていた。半数以上の農民は、病虫害に耐性の強い改良品種を利用していた。また、抜き取り処分のような栽培的防除はほとんど行われておらず、その理由は ACMD のような病虫害管理を優先事項として認識していないためであった。農民の男性・女性ともに、農民現場学校に参加したことは、改良品種の入手を可能にしていたが、彼らの作物管理に対する意識や手法には大きな影響はなかった。農民現場学校においては、農民自身が実施する意思がありまたその手段もある作物管理の手法を用いた適切なカリキュラムの設計が重要な課題であることが認められた。エイズの影響を受けている地域において、小規模農民が農民現場学校に参加する動機づけについて、更なる考察とカリキュラムの再設計が必要と考えられる。この調査の結果に基づき、自給用作物に対する農民現場学校の実質的・潜在的有効性を考察した。

第 3 章ではチルンバ地域の稲作とキャッサバ生産を主とした 3 地区、30 名の農民に対して、反復・綿密面接法および、作付状況に関する調査を実施した。個人の家系図を分析することにより、「社会的免疫力」の限界についての調査を試みた。エイズの影響の段階を推定するための基準を設定し、回答者を 3 種類に分類した。第 1 は自ら影響を受けていると申告した者、第 2 は家系図中に関連した原因による死者がいることにより影響を受けていると考えられる者、および第 3 は影響を受けていないと申告した者である。ただし、血液検査の結果については、検証されていない。面接法により得られた家系図データを、ソフトウェア Legacy を用いて分析した結果、様々な機会やストレスに対する対処戦略が確認された。影響を受けていると申告した回答者の間では、様々な支援先を求める場合が多く、これは「限界値」を超えたストレスにより、拡大家族による扶助制度の崩壊のしるしと見なすことが出来、「New Variant Famine」仮説を裏付けると思われる。しかしながら、本研究の結果では、個人レベルではエイズの影響は明らかであったものの、総合的にみてエイズによって起きるリスクは他の原因のリスクとの連続体の一部分であるということが示唆された。そのような状況では、エイズの影響のみを世帯の問題対処における決定的因子と捉えるのは誇張である可能性がある。多様なストレスに直面した時の、社会的生活環境に対する代替的な戦略を理解するためには、より詳細な研究が必要である。

第 4 章では異なった社会的生活環境を持つチルンバ地域の 3 地区、30 名の農民に対する綿密なライフヒストリーの語りに基づいて作成した、個人別の地理的移動図に関して分析した。エイズの影響の段階を推定するための基準を設定し、回答者を 3 種類に分類した。第 1 は自ら影響を受けていると申告した者、第 2 は家系図中に関連した死者がいることにより影響を受けていると考えられる者、および第 3 は影響を受けていないと申告した者である。地理的移動データはソフトウェア Legacy を用いて作成した地図として示された。移動の頻度は個人毎に大きく異なり、エイズの影響の段階や、社会的生活環境、および性

別との相互関連性は認められなかった。全ての回答者のうち 3 分の 1 はその人生の大半をチルンバ地域内で過ごしていた。転居に関しての多様な理由が認められ、それらの理由は保護者の都合によるもの、教育によるもの、収入の機会によるもの、結婚によるもの、離婚によるもの、それ以外といった 6 種類に分類された。エイズの影響の 3 つ全ての段階および男女両方に共通した移動の頻度と範囲により、「コミュニティ」という概念の境界が不安定であることおよび、多様かつ認識されたあるいはコントロール不可能なリスクに対する通常の反応としての、貧困によってもたらされるプルーリアクティビティ（兼業）が示唆された。移動性の高いことはエイズに関連したリスクとして知られているが、この結果を総合的にみれば、エイズに対する危険性という意味で最も決定的要因ではない可能性があるということが示された。こうして確認された多様なストレスに直面した時の、社会的生活環境に対する代替的な戦略の理解には、更なる研究が求められる。

第 5 章では 30 名の農民のライフヒストリーの語りを元に、エイズに対する認識の変化や、その影響に対する人々の反応を分析した。回答者は性別・社会的生活環境・エイズの影響の段階といった 3 種類の変数によって分類された。ライフヒストリーでは、回答者は近親者の死や疾病、転居、結婚、離婚、学校からの中退など、彼らの「社会的免疫力」を脅かした様々な危機的事象を報告した。これらの事象は、エイズ単体よりもより幅の広いリスクであり、エイズに関連した援助を行う際に考慮する必要がある。エイズの影響を受けていると分類された回答者にとっては、自らの血液検査の結果が陽性だと分かった時が、重要かつ、時には前向きな転換期となり、それを契機に支援団体に加わったり自分達の置かれた立場の持つ意味についての議論に積極的に参加したりするなどの行動変容が起きていることが確認された。このことにより、公衆衛生政策上のもう一つの提言として、裨益者の保健サービスへのアクセスを高めると同時に、社会的・組織的そして人的な能力を強化することにより、外部からは最も影響を受け能力を損なわれているとレッテルを貼られがちである人々の「社会的免疫力」を一段高めることにつながる可能性があるということが指摘された。

第 6 章ではマラウイ北部の小規模農民に対する総合的病虫害管理および農民現場学校の有効性について評価した。データは農業省による実態調査、NGO 関係者やドナーの主要情報提供者に対する面接、チルンバ地域におけるキャッサバ農民現場学校の観察および、2 度行われたマラウイ農民現場学校ステークホールダーワークショップへの参加によって収集された。これらの情報の組み合わせの分析により、マラウイにおける農民現場学校は既に設定されている問題に対し、予め選択された解決法を導入するための、従来のグループ型デモンストレーションの変形として扱われていることが示唆された。農民現場学校の実施上の課題に対応するためには、政策の改革および、普及員と農民ファシリテーター両方に対する訓練が必要である。キャッサバ生産に関して認められた課題の多くは、低収量や病虫害による問題というよりはむしろ、改良品種への入手など制度面にかかわるものであった。このため、農民現場学校のカリキュラムの作成にあたっては、より柔軟かつ幅広いアプローチが求められることが分かった。特に、マラウイの他地域では小規模キャッサバ農

家に対して、家庭内あるいはコミュニティ内で様々な加工産品を生産・販売し、より市場指向となることの潜在的可能性が示されている。本研究をきっかけに、マラウイにおける農民現場学校のプラットフォームの立ち上げが促され、マラウイの実務者と東アフリカの農民現場学校ネットワークとの連携への糸口となった。

第 7 章では、本研究の全体の目的と調査質問が再度紹介され、本研究で用いられた全ての調査手法やプロセスの長所と短所が個別に評価された。更に、主な結果を元に、「New Variant Famine」仮説には、本論文で見られたような、人々が自らの血液検査の結果を受け容れることにより、地域レベルで起きている新たな社会ネットワークに参加するといった、前向きな変化を考慮したニュアンスを加えることが必要だと提案した。エイズの影響と、それに対するキャッサバを基にした社会的生活環境における反応の相互作用により、農民たちは人生の中での様々なリスクに対処することを強いられている。人々が社会的生活環境に対する多様な戦略や反応を、しばしば地理的に広範囲にわたる移動を伴って計画することにより、彼らの代理権（agency）をどのように行使しているかということが、経験的に示された。その過程で彼らは、自らの社会的生活環境やアイデンティティ、彼らの直面するリスクに対しての認識を確立する。最後に、マラウイにおける総合的病虫害管理と農民現場学校のこれまでの発展を考慮して、サブ・サハラアフリカにおける農民現場学校に関する政策を考察した。作物保護や制度的問題、そしてエイズを含む新たな課題が議論の焦点となった。また、マーケティングやネットワーキングといった新しい機会が認識された。農業教育および普及活動は、気候変動のような将来の課題に対応するために強化される必要がある。マラウイではエイズによる厳しい人的損失が続いたとしても、様々なレベルで能力を復活し、再構築する可能性がある。本論文の結論として、将来の研究分野を提示し、特に長期に渡る小規模農家の支援により地域レベルでの様々な環境下での機会を見出し、様々な課題に対処できるよう農民現場学校のカリキュラムの開発を組み込むことを提案した。

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Matumatuma njoka bakayinora maweya. A snake who always delegates does not have the feathers. (*ChiTumbuka* saying, my interpretation)

Midori
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これからもどうぞ、よろしくお願い致します。

2010 年 1 月
谷島　緑

Personal History

Midori Yajima was born on 18 January 1970 in Tokyo, Japan. She studied Agricultural Chemistry at Meiji University, School of Agriculture, in Kawasaki, Japan, with her bachelor's thesis in food chemistry research at the laboratory of Professor Nobuyuki Tsusaka. From April 1992 to August 1998, she worked in the Research Planning Department at Fujirebio, Inc., Tokyo, Japan. In September 1998, she joined Japan Overseas Cooperation Volunteers (JOCV) programme, organised by Japan International Cooperation Agency (JICA). She worked as a Rural Development Officer for two years at Chitsime Extension Planning Area (EPA), under Lilongwe East Rural Development Project (RDP), Lilongwe Agriculture Development Division (ADD), under the Ministry of Agriculture in Malawi. During the appointment, she also worked on 'Resource Book on Rural Development in Malawi' (http://tiyeni.tripod.com/) in collaboration with Yasuko Kusakari and Yuki Kobayashi. In October 2003, she obtained a Masters degree in Environment, Development and Policy at the University of Sussex, Brighton, United Kingdom, with a dissertation titled 'An Analysis of Transboundary Movement and Disposal of Hazardous Materials in Sub-Saharan Africa', supervised by Dr. Julian Saurin. From July to November 2003, she worked as a Resource Mobilisation Officer at International Planned Parenthood Federation (IPPF), London Central Office, UK. From January to August 2004, she worked as a Project Assistant at African Institute for Capacity Development (AICAD) Country Director's Office, headed by Professor Amon Z. Mattee, at Sokoine University of Agriculture, Morogoro, Tanzania. Thereafter, she worked as an Assistant Researcher at International Development Research Institute, Foundation for Advanced Studies on International Development (FASID) in Tokyo, Japan, from November 2003 to January 2004; from September to December 2004; and in March 2008 participated in various research projects under Japan's Official Development Assistance (ODA). Since January 2005, she has been registered as a PhD student at the Laboratory of Entomology, Wageningen University, working on a project 'Livelihoods of cassava farmers in the context of HIV/AIDS in northern Malawi'. Her PhD work has been sponsored by Institute for International Cooperation (IFIC), JICA; FASID; The Murata Science Foundation and The Matsushita International Foundation, Japan.

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PE&RC PhD Education Certificate

With the educational activities listed below the PhD candidate has complied with the educational requirements set by the C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE&RC) which comprises of a minimum total of 32 ECTS (= 22 weeks of activities)

Review of Literature (5 ECTS)

- Cassava production and soil protection, HIV/AIDS epidemic in southern Malawi: the background, potential application and development process of experimental learning approach to the Cassava Clubs in Domasi (2005)

Writing of Project Proposal (6 ECTS)

- Cassava cropping and HIV/AIDS: an assessment of the contribution of IPM/FFSs to crop protection, food security and family health in Malawi (2005)

Laboratory Training and Working Visits (1 ECTS)

- Training on field sampling on cassava pests and diseases; Chitedze Agricultural Research Station/ Bunda College (2007)

Post-Graduate Courses (8 ECTS)

- Social impact assessment; Professor Henk Becker, Utrecht University (2005)
- HIV/AIDS Prevention, control, care and advocacy; Institute of Public Health, Copenhagen University (2006)

Deficiency, Refresh, Brush-up Courses (18.8 ECTS)

- Research methods in environmental science; WUR (2005)
- Methods, techniques and data analysis for field research B; WUR (2005)
- Presentation skills; WUR (2005)
- ChiChewa/ ChiTumbuka language course; University of Malawi (2006-2007)
- Qualitative research methods and analysis; WUR (2008)
- Basic statistics; PE&RC (2008)

Competence Strengthening / Skills Courses (3.1 ECTS)

- Working with EndNote 8; WUR (2005)
- PhD Competence assessment; WGS (2005)
- Technuques for writing and presenting a scientific paper; WGS (2008)
- Career orientation; WGS (2009)

Discussion Groups / Local Seminars and Other Scientific Meetings (6.3 ECTS)

- Social learning discussion group (2005)
- Yearly Entomology Laboratory Reaearch Exchange Meeting (2005)
- Domasi stakeholders workshop; Domasi (2005)
- PhD Lunch discussion group ; Entomology (2005, 2008-2009)
- Communication and innovation studies research meeting (2005, 2008-2009)
- Research seminars at Bunda College, University of Malawi, Lilongwe (2006)
- Farmer field schools stakeholders workshop; Lilongwe (2007)

PE&RC Annual Meetings, Seminars and the PE&RC Weekend (1.1 ECTS)

- PE&RC Weekend (2005)
- PE&RC Day (2005)
- PE&RC Day (2008)

International Symposia, Workshops and Conferences (4.1 ECTS)

- The 8th International Conference on Education and Development: Learning and Livelihood; UKFIET, Oxford (2005)
- The 77th International Conference on Agriculture and Development (ICAD); Royal Tropical Institute, Amsterdam (2005)
- The XVIth International Plant Protection Congress; BCPC, Glasgow (2007)
- WOTRO Research day; NSO, Utrecht University (2009)

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