The impact of HIV and AIDS on household food security and food acquisition strategies in South Africa

SARAH KASCHULA

A thesis submitted in fulfilment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Department of Environmental Science

Rhodes University

Grahamstown

South Africa

December 2008

Abstract

How should the impact of HIV and AIDS on rural livelihoods be factored into efforts to monitor and stabilise household food security? With both HIV and AIDS and food security at the top of the global development agenda, this is a question posed by many scholars, practitioners, donor agencies and government departments. However, while there is an excess of discourse outlining the theoretical bases for how HIV and AIDS can, and is, radically transforming household food acquisition; there is a lack of empirical evidence from the South African context that demonstrates if, and how, HIV and AIDS changes household-level strategies of food acquisition and intake. This thesis explores the association of household-level mortality, chronic illness and additional child-dependent fostering with household experience of food security and food acquisition strategies, in three rural villages in the Eastern Cape and KwaZulu-Natal Provinces of South Africa. Qualitative and quantitative methods of data-collection were applied to 307 households in the three sites. For twelve months, both HIV and AIDS-afflicted and non-afflicted households were repeatedly visited at 3-month intervals, in order to be assessed for levels of food security, dietary intake and method of food procurement (purchased, cultivated, wild or donated). Overall, HIV and AIDS-afflicted households showed a significantly higher experience of food insecurity, probably attributable to shortages in food quantity. Dietary composition and overall diversity, however, was not significantly different. Although households with chronic illness and recent mortality showed a heightened investment in cultivation sources, the success of these strategies were to a great extent mediated by household income, and the level of medical treatment received by those who were chronically ill. Chronic illness was also associated with more donations, but these required considerable investments in social capital networks. Finally, use of wild leafy vegetables was not associated with household HIV and AIDS status, despite the financial, nutritional and labour-saving properties of these foods. Overall, the study suggests that there was little evidence of long-term planning and strategy in household food security responses. There was no evidence for shifts to labour-saving crops or foods and, in some instances, child labour was being used to ameliorate prime-adult labour deficits. Moreover, given that the vast majority (89.2 %) of food groups were sourced through purchase, it is questionable whether investing in diverse food acquisition strategies would be advisable. Unless supported by medical treatment and steady earned household income, policies to promote intensified household agricultural subsistence production in the wake of HIV and AIDS are unlikely to provide households with anything more than short-term safety-nets, rather than long-term, sustainable food security solutions.

Declaration

I declare that this thesis is my own work and that all other sources used or quoted have been fully acknowledged and referenced. It is being submitted for the Degree of Doctor of Philosophy at Rhodes University and has not been submitted for a degree or examination at any other university.

Sarah Alice Hart Kaschula

Signature……

11 December 2008

TABLE OF CONTENTS

List of Figures

List of Tables

Acronyms and abbreviations

AIDS	Acquired immunodeficiency syndrome
CSI	Coping Strategy Index
DHS	Demographic and Health Survey
ERA	Experience of Resource Augmentation
ERR	Experience Resource Restriction
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organization
FIVIMS	Food Insecurity Vulnerability Information and Mapping System
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
HIV	Human Immunodeficiency Virus
HFSSM	Household Food Security Survey Measure
HHH	Household Head
HLS	Household Labour Score
LSMS	Living Standards Measurement Surveys
NGO	Non-Governmental Organization
NVAC	National Vulnerability Assessment Committee
NVF	new variant famine
PA	Prime Adult
RVAC	Regional Vulnerability Assessment Committee
UNDP	United Nations Development Program

VAC	Vulnerability Assessment Committee
WFP	World Food Program

Acknowledgements

This research was funded with a grant from the Rockefeller Brothers Fund (RBF), and I gratefully acknowledge this support. Throughout the project, the RBF have offered both flexibility and support - a truly unique combination. A special thanks to Nancy Muirhead, for her approachability, dedication and obvious passion for the projects she oversees.

I would like to thank my supervisor Charlie Shackleton, whose balanced, even-headed perspective was always behind me throughout this project. I would like to thank him for allowing me the freedom to find my own direction in this complex field, while at the same time encouraging me to keep it short, concise - and always relevant.

Many thanks too for the time and thoughtful comments offered to me by Dr. Kevin Kelly, and for the enthusiastic and stimulating input offered by Dylan McGarry.

I would also like to acknowledge the input and assistance of my field assistant Lindiwe Nisibande, whose gentle humour and compassion made the research we were conducting seem so effortless.

To all the households and individuals who gave me their time and their stories, thank you. Your experiences greatly moved me, and challenged me. I apologise if you have not found a voice in this thesis.

For my Family – my mother Susan and my father Bryan, thank you for always supporting me throughout this thesis, and through all I have ever known. Your example has moulded who I am, and what I write. To my new Family, Eileen and Dave Chapman – thank you for continuing to support both me and Dean so unconditionally through our long, long studies. A special mention should also go to Rebecca and Mandy, for seeing me through some of the more unexpected outcomes of this thesis.

To Dean, thank you for accompanying me throughout this project, and promising to be with me into the time beyond. For making my time in Zululand with you such a special memory. Your warm, thoughtful, humorous approach has influenced me more than you know. It is, I hope, reflected in this work.

Chapter 1. Introduction, theoretical overview and study approach

INTRODUCTION

There is a growing consensus among commentators, researchers, policy-makers and practitioners working in development fields that HIV and AIDS is a major driver fuelling regional food insecurity in heavily afflicted regions of sub-Saharan Africa. Yet while the negative feedbacks between HIV and AIDS and food insecurity are well elaborated in theoretical discourse (Gillespie *et al.* 2001; De Waal and Whiteside 2003; Jooma 2005), and the link itself is seldom disputed – when it comes to policy and planning, there is less consensus as to how this 'AIDS effect' on household food security is likely to manifest. This confusion is not surprising; as in poor, rural environments household food acquisition strategies are typically very diverse, as the degree of diversity exhibited by a household has been directly tied to increased food intake (Block and Webb 2001).

Given the importance of diverse food-acquisition strategies to livelihood resilience, this thesis acknowledges that an HIV and AIDS impact on household food security needs to be examined through an analysis of the relationship between HIV and AIDS and diverse household food acquisition strategies. HIV and AIDS is believed to be extremely damaging to food security precisely because it erodes food security resilience on multiple levels and in varying degrees (De Waal and Whiteside, 2003). Any investigation into the impact of HIV and AIDS on household food security in rural African environments will thus need to determine the extent to which local populations are dependent on diverse acquisition strategies for food security and the degree to which HIV and AIDS is affecting these. The possibility will also need to be entertained that, whereas one food security acquisition strategy may suffer HIV and AIDS-associated declines, other food security acquisition strategies may be in turn amplified.

This thesis uses empirical investigations from three case-history sites in rural South Africa to describe the diversity of local food acquisition strategies by rural households; quantify the contribution of these strategies to local diets, overall household nutrition and food security; and describe the association of household HIV and AIDS with their implementation. Given the emphasis placed on livelihood diversity, the conceptual framework for this thesis borrows

from the sustainable livelihoods framework, which acknowledges that a broad base of livelihood 'capitals' underscores local livelihood and food security resilience.

In order to describe these diverse livelihood capitals, close attention is played to the role of the natural environment in local food-acquisition strategies. These include household subsistence cultivation activities (Chapter 4). Importantly, however, this thesis also prioritises less well-studied areas through which rural people might make use of the natural environment to inform their food acquisition strategies. These include the incorporation of wild natural resources into the diet: wild leafy vegetables (Chapter 5). Finally, the poorly understood relationship between social capital networks and household food access will be given particular attention, through quantifying the incidence and significance of food transfers between households (Chapter 6).

Although the themes addressed in this thesis have relevance for informing general HIV and AIDS and food security policy and practice, this thesis is specifically designed as a detailed South African case study. Consequently, the hypotheses that prefix this thesis are strongly influenced by the local context of South African food security monitoring and interventions. This context is reviewed in the sections that follow, which provide an historical overview of South African food security monitoring and interventions in the era of HIV and AIDS.

HISTORICAL OVERVIEW

Early conceptualisations of the impact of HIV and AIDS on land-based livelihoods: 1980s–2000.

As early as the 1980s, commentators were already predicting that HIV and AIDS would be a major threat to the food security of afflicted nations (Abel *et al.* 1988; Gillespie 1989). HIV and AIDS, it was theorised, would trigger declines in household labour availability, which would result in – among other things – a reduction in the size of area under cultivation, changes in crop-choices and an increase in fallow land. Early studies, however, lacked empirical data and relied on models that overlaid knowledge as to HIV and AIDS's likely demographic impact on available statistics of a country's agro-ecological zones and current crop outputs (Gillespie 1989). Yet despite the lack of empirical information at the time, these studies regularly concluded with the same call to action that is echoed today: the urgent need for empirical, longitudinal studies that attempt to create a broadly generalizable framework of understanding and action as to the impact of HIV and AIDS on household food security.

In response to this call, in 1992 Barnett and Blaikie published *Aids in Africa*, in which the authors meticulously followed some 140 households in several Ugandan villages in Rakai in order to describe how reductions in family labour affect farm production. Barnett and Blaikie (1992) believed that HIV and AIDS destroys the household economy first through the primary impact of reducing familial labour power, then by eliminating the extra cash needed to hire additional labourers. Households become impoverished, and the land goes fallow and infested with weeds. The authors found a variety of strategies that they termed coping mechanisms in use in Rakai – including new agricultural and household adaptations, but none of these were sufficient to prevent the growing impoverishment and dislocation.

Aids in Africa caused a considerable stir in the development communities, offering for the first time well-documented empirical evidence for effects that had hitherto only been considered in theory. International research and aid organisations such as USAID, the UNDP and FAO began to show an increasing interest in research into the impacts of HIV and AIDS on small-scale household agricultural production, as well as large-scale agricultural growth. In 1993, the FAO commissioned a series of field-report case studies on the effects of HIV and AIDS on agricultural production systems in Uganda, Tanzania and Zambia. The study, which was partially supervised by the authors of *Aids in Africa,* largely confirmed the earlier indications of Barnett and Blaikie (1992). The impact of HIV and AIDS on rural households was largely polarised into two fields of impact, which fed back into one another over time. The first of these was direct (financial) costs and the second was so-called indirect costs, which are mainly labour-related. Labour-related impacts in turn impacted negatively on crop production, which was related to a reduction in land use, a decline in crop yields and a decline in the range of crops grown (Drinkwater 1993; Barnett 1994; Haslwimmer 1994; Barnett *et al.* 1995).

At the time, however, HIV and AIDS prevalence was still relatively low and large-scale quantitative studies were difficult to conduct. Evidence was still largely anecdotal and case-history based. For example, amongst the 34 cluster case studies comprising 150 households examined for the FAO by Drinkwater (1993) in Zambia, only five had primary producers (the household most responsible for food security) whose production had decreased in 1992/93, despite it being a good season following drought. However, Drinkwater (1993) noted that in all five cases, the reason for decreased production was ill health and all attributable to HIV and AIDS. On the basis of this, it was predicted that the continuation of this trend would be even more devastating on livelihoods because the loss of household heads, following the long depletion of their productive assets, would result in the impoverishment of the remaining family members and the likely breakdown of the family structure (Drinkwater 1993).

Subsequently, a number of reports followed from this research which focused on the impact of HIV and AIDS on farming systems in eastern Africa (FAO 1995; Barnett *et al.* 1996). These reports considered sectoral policy and planning and recommended interventions such as extending the planting period, crop diversification and reducing external input requirements, improved livestock management techniques and priority given to women and children, who were deemed particularly vulnerable. In the late 1990s, a study by Tibaijuka (1997) in Tanzania looked at household labour-allocation given the presence of an AIDS patient and found that 29 % of household labour was spent on AIDS-related matters, including care of the patient and funeral duties. These findings served to strengthen position that HIV and AIDS was producing a crisis of household labour. Increasingly, recommendations to the agricultural sector were gravitating towards the promotion of labour-saving devices and switches to labour-saving crops to promote agricultural efficiency in the wake of the disease (Hemrich and Schneider 1997).

Despite southern Africa having the highest HIV and AIDS rates, it was only in the late 1990s that the first tentative steps were made into exploring its effects on household labour. Kwaramba (1997) found that households in Zimbabwe who had members suffering from HIV and AIDS showed a 29 % reduction in number of cattle kept and a 61 % reduction in maize yield relative to non-afflicted households. These, along with other challenges, were supported by Ncube (1998).

As a result of the somewhat tentative development of southern African research into issues relating to household labour and HIV and AIDS, by 1999 when UNAIDS commissioned a review of existing knowledge as to household and community responses to the HIV and AIDS epidemic in rural Sub-Saharan Africa, there was very little empirical evidence to review outside of the eastern African region. As a result, the report largely confirmed the already dominant view that strategies to overcome loss of household labour are one of the top three impacts of HIV and AIDS, along with strategies to adjust to losses of household food security and regain economic stability. Above all, the importance of prioritising the relationship between HIV and AIDS and household crop cultivation was noted: as crop production was tied to all three aspects of HIV and AIDS impacts, namely household labour, food security and economic stability (Mutangadura *et al.* 1999).

New variant famine and research in the new millennium

In the period from 2001 to 2002, the spotlight was shifted dramatically and unexpectedly to the southern African region due to an unprecedented period of intense food shortages throughout the area. The food shortages were in part attributable to a widespread drought over that time, which had caused seasonal crop failure throughout the region. Yet even granting the impact of drought on food production, the intensity of the famine response within southern Africa was deemed by experts to be excessive. The southern African region has been in the past frequently affected by transient food-security shocks, yet there had never been recorded a response of this magnitude. In due course, the hypothesis was put forward that the apparent lessened ability of southern Africans to cope with food security hardships was due to the impact of HIV and AIDS (De Waal and Whiteside 2003). This so-called new variant famine (NVF) hypothesis suggested HIV and AIDS had reduced the inherent resilience of southern African communities to respond to food security crises. Could it be that the HIV and AIDS-induced collapse of rural livelihood systems that researchers had been grimly prophesising for more than a decade was finally becoming perceptible on a mass scale?

The NVF hypothesis was an insightful and compelling theory. Although its proponents admitted that it was still just a hypothesis and as yet "unproven", the theory was liberally entertained by international aid agencies who were at the time struggling to cope with the dramatic food insecurity then evident in southern Africa. Interest in labour-saving agricultural technologies intensified and a number of policy-level reports emerged advocating that household labour deficits be addressed through the provision of labour-saving farming equipment and crops (Du Guerny 2002; De Waal and Tumushabe 2003; Kadiyala and Gillespie 2003). In the southern African region, a number of initiatives implemented by governmental and non-governmental institutions, specifically aimed at addressing the HIV and AIDS labour 'problem' also became conspicuous. For example, in 2002 a Lesotho-based program entitled, Livelihoods Recovery through Agriculture was implemented by CARE and the Ministry of Agriculture, which promoted crops with high nutritional content on small plots of land close to the home, in order to directly address HIV and AIDS-driven labour and nutrition deficits.

In addition, since 2002 there has been an increase in the amount of empirical research into the relationship between land-based livelihoods and HIV and AIDS in southern Africa. This was a considerable step forward for HIV and AIDS research, as hitherto most HIV and AIDS and livelihood studies have been target studies, based on micro-level case-studies and drawn from areas purposively chosen because they were known to have high HIV infection rates (Hunter *et al.* 1993; Drinkwater 1993; Barnett 1994). As a result, there was often an absence of a control group to contrast afflicted household responses with those of unafflicted households.

This new body of empirical research can be broadly divided into three main clusters. The first is dominated by research conducted by international donor agencies with a view to informing food aid, environmental and development policies. Foremost of these are the reports issued by the SADC Regional Vulnerability Assessment Committees (RVACs), who in 2002 coordinated emergency food security assessments in six southern African countries: Malawi, Zambia, Zimbabwe, Lesotho, Swaziland and Mozambique. In each of the countries National Vulnerability Assessment Committees (NVACs), composed of host governments, UN agencies and NGOs, took the lead in the data collection, analysis and report write-up. The data used in this study was gathered from 2,695 households from Malawi, Zambia and Zimbabwe surveyed in 2002. At the same time, also in 2002, the FAO initiated research involving 1,889 rural households in northern Namibia, southern Zambia and around Lake Victoria in Uganda, with a view towards exploring the relationships among HIV and AIDS, gender, agricultural production, food security and rural livelihoods. An additional HIV and AIDS-sensitised study formed by a VAC-FAO coalition was also conducted in Swaziland in 2003.

The reports that have issued from these FAO and SADC RVAC surveys, key findings of which are highlighted throughout this thesis, have certainly increased understanding of how HIV and AIDS affects land-based livelihoods. However, it should be noted that these studies are significantly limited by their lack of methodological and analytical transparency. Findings are mostly reported with no indication of whether potentially confounding covariates were accounted for and if so-called 'AIDS effects' are statistically significant when compared to controls.

A second cluster of research was initiated in 2002 by a group of southern African research institutes and universities, public policy units and international donors, who comprise the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN). The constitution of FANRPAN was signed in 2002, in collation with the Ministers of Agriculture from a number of southern African countries (including South Africa) and ten research and policy institutions. The constitution identified four priority areas, two of which were to examine the impact of HIV and AIDS on agriculture and rural livelihoods. Towards this aim, in 2004 FANRPAN initiated research on the impact of HIV and AIDS in the seven most affected countries in southern Africa: Botswana, Lesotho, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. Although the methodology was different for each country, all country-studies typically drew on qualitative interviews as well as quantitative household surveys of between 200 and 420 households, which had been purposively selected and stratified as 'afflicted' on the basis of presence of prime adult chronic illness and/or presence

of recent prime adult mortality. The results of these seven-country studies were then synthesized into a report entitled *Silent hunger: Policy options for effective responses to the impact of HIV and AIDS on agriculture and food security in the SADC Region* (FANRPAN 2007), which was widely distributed via the public media.

As with the SADC VAC and FAO reports, *Silent Hunger* was targeted at the level of policy-makers and practitioners. All data were presented as simple descriptive statistics (counts and percentages), with no indication as to what (if any) variables had been adjusted for in the results and if apparent differences in means reported between 'afflicted' or 'unafflicted' groups were statistically significant. Moreover, the report offered a synthesis of findings from all seven countries, which made detailed country-level analysis and comparisons difficult. This was aggravated by the fact that the HIV and AIDS proxy-system between countries was not always clearly disaggregated and standardised, which makes it difficult to compare levels of 'affliction' and their associated effects, between regions. Moreover, although De Waal and Whiteside (2003) had clearly stated that their NVF hypothesis was an, as yet, a non-validated hypothesis, *Silent Hunger* was ultimately bound by the FANRPAN constitutional edict to respond to and describe the impact of HIV and AIDS on food security and agricultural production, not to validate whether there was an impact in the first place. This explicit acceptance of the NVF hypothesis was outlined in no uncertain terms in the press release for *Silent Hunger*, which stated that, "Hunger and HIV and AIDS are reinforcing each other in Southern Africa, 'leading to a potentially tragic new level of famine'... Often described as 'new variant famine' or 'HIV-induced famine', this form is radically different from traditional famines" (PlusNews 2007).

In addition to the research undertaken by the FAO/SADC VAC and FANRPAN, a final cluster of empirical research has been led by a group of researchers at Michigan State University (MSU) Department of Agricultural Economics. Unlike the FAO and FANRPAN research initiatives, this research relied on retrospective analysis of existing panel data, rather than the collection of original data in target research communities. The MSU research reports emanating from this body of work, highlights of which are referred to in the sections which follow, combined the inputs of nine researchers representing Malawi, Mozambique, Kenya, Rwanda and Zambia (Mather *et al.* 2004; Mather *et al.* 2005). The Kenyan and Malawian studies were based on panel surveys separated by three and ten years, respectively, and cross-sectional data were used for Rwanda, Mozambique and Zambia. Although initially analysed in cross-section, data from Zambia was later analysed as panel data and published in the *Review of Agricultural Economics* (Jayne *et al.* 2006). Unlike the aid-agency research reports

referred to in the preceding section, the MSU research was well reported in the academic literature (Yamano and Jayne 2004; Jayne *et al.* 2006).

The results of these three clusters of analyses have provided a wave of empirical data exploring the relationship between HIV and AIDS, rural livelihoods and food security. The insights provided by the above mentioned research are reviewed throughout this thesis and are used to inform and contextualise the empirical findings presented in each chapter. Overall, I will endeavour to illustrate that the empirical basis for interpreting the impact of HIV and AIDS on household food security provides a considerably more complex picture than suggested by prevailing theoretical discourses. Although there appear to be several common themes in household responses to HIV and AIDS; local responses are strongly flavoured by site-specific determinants relating to socio-economics, gender, culture and the inherent agro-ecological productivity of the land. This makes it exceedingly difficult to generalize existing research into local-level (or indeed national-level) recommendations relevant to a specific context.

In South Africa, this problem of non-generalizability is further confounded by a number of key challenges or research gaps in our understanding of HIV and AIDS and food security interactions, which are reviewed in the sections which follow. Thematically, these are (1) a lack of appreciation of the importance of land-derived natural products to rural livelihoods and food security in South Africa, and in the South African HIV and AIDS context, (2) an uncertainty as to how interventions aimed at improving the food security status of South African households (particularly in the era of HIV and AIDS) should be structured, and (3) a lack of clarity as to how the food security status of South African households should be monitored in the era of HIV and AIDS; specifically, what would constitute HIV and AIDS-sensitive food security indicators and how to incorporate them into South Africa's nascent food security monitoring and assessment systems.

These challenges and research gaps directly inform the research methodology and outputs of this thesis and are reviewed in the sections which follow.

THE SOUTH AFRICAN CONTEXT

Understanding the role of land-derived natural products in the context of HIV and AIDS

South Africa is currently estimated to have a HIV prevalence for adults aged 15–49 years of 18.1 % (UNAIDS 2008). This is the fourth highest national prevalence globally and the highest number of people living with HIV of any country. Given this prevalence, it is perhaps surprising that the impacts of HIV and AIDS on land-based livelihoods (and food security) in South Africa are so poorly understood. Available data is scant and, when present, often piecemeal and anecdotal in nature. For example, although FANRPAN (2007) did include South Africa in their seven-country study, these data is not presented in country-disaggregated form and the reported research results are not, as discussed earlier, highly detailed. In like manner, a series of reports commissioned by the FAO and conducted by the South African Human Sciences Research Council on HIV and AIDS and land-based livelihoods in South Africa have been similarly plagued by small sample sizes (usually less than 20 households in a given case-study) and an anecdotal research-style (Adams *et al.* 2002; Drimie 2003). As Aliber and Drimie (2004) noted in a commentary written for the HSRC, most research around HIV and AIDS and land-lased livelihoods in South Africa is based on general observations and personal experience and, for the most part, there is a difficulty distinguishing direct from indirect evidence. Aliber and Drimie (2004) observe that much of the current understanding of HIV and AIDS impacts in South Africa come from focal group discussions, key informant interviews and other techniques that rely on "people who know" explaining the phenomenon. The authors suggest that the resulting commentary frequently shows a blurring of fact, rumor, opinion and hearsay. At the heart of this problem is a lack of hard, quantitative evidence that addresses temporal change.

Why has South Africa been neglected in research that explores the impact of HIV and AIDS on land-based livelihoods? The reasons for this may be in part attributable to South Africa being the only southern African country that is not aligned to the SADC Vulnerability

Assessment Committees and thus is not incorporated into the FAO/SADC RVAC livelihood baseline assessments from which a large portion of our understanding as to the dynamics between HIV and AIDS and rural livelihoods is derived. It may also be that the impact of HIV and AIDS on rural land-based livelihoods has been cushioned in South Africa due to relatively the high volume of government grants and remittances received in South Africa compared to elsewhere in sub-Saharan Africa. This relationship between poverty and

household state-support means that income is recognized as the most important determinant of household food security in rural South Africa and, as a result, rural South Africans are generally considered less reliant on subsistence agriculture than elsewhere on the continent (Bryceson 2003; De Klerk *et al.* 2004; Van Averbeke and Khosa 2007). Research on the household-level impacts of HIV and AIDS in South Africa has thus focused primarily on the association between HIV and AIDS and household income and expenditure (Desmond and Gow 2001; Bachmann and Booysen 2003; Bachmann and Booysen 2004; Carter *et al.* 2007), and the role played by social grants in ameliorating this effect (Booysen 2004).

The lack of research into the impact of HIV and AIDS on land-based livelihoods in South Africa raises the question: how important are land-based activities to rural livelihoods, and rural food security, in South Africa? This question is relevant, because post-apartheid South Africa is understood to be characterized by recent increases in access to and availability of social welfare grants, which are believed to have considerably modified local food consumption patterns through heralding a shift from reliance and use of local produce in favour of cash food purchases (Hendriks 2005). This warrants the suggestion that South Africa might be a special case among African countries affected by HIV and AIDS, in that land-derived natural products are to be considered secondary (if not altogether superfluous) relative to the contribution of household income on household welfare. Moreover, many areas occupied by poor rural communities in South Africa are either semi-arid savannas, or degraded over-utilized communally-accessed grasslands, which without considerable agrarian interventions are generally deemed unsuitable for agricultural activity. Indeed, the potential of these areas to support any form of land-based livelihood in the conventional agrarian or pastoral sense has historically been regarded as very low (Shackleton 1993).

While acknowledging that financial capital is generally the dominant factor driving rural livelihood and rural food security in South Africa, and recognising that the impact of HIV and AIDS on rural food livelihoods and rural food security will primarily be manifest through the relationship between HIV and AIDS and household income and expenditure over time, in this thesis I maintain that the importance of land-derived natural products to rural livelihoods and food security in South Africa cannot be ignored. As a result the relationship between land-based livelihoods and HIV and AIDS is in need of closer examination.

There are a number of motivations to support this assertion. Firstly, it is estimated that 43 % of the population of South Africa live in rural areas (World Bank 2007) and so-called "subsistence" farmers make up a total of 26.4 % of all South African households (Pauw 2007). There are indications that in these former homeland areas, subsistence agriculture can be far more widespread than national household-level averages would indicate and that in a

number of regions rural communities are relying on surplus stores of cultivated foods to tide them over through hard times. For example, in the Ubombo, Hlabisa and Ngwavuma regions of KwaZulu-Natal, Thamaga-Chitja *et al.* (2004) found 84 % of household cultivated and stored maize, whereas Kirsten reported a figure as high as 93 % for the Nkandla district (Kirsten *et al.* 1998).

Secondly, there is evidence from other African countries that agriculturally-active households may be particularly prone to negative impact of HIV and AIDS-associated food insecurity due to the inherent poverty and vulnerability of this particular subgroup (Drinkwater 2003a). This assertion is relevant to the South African context as, of the thirty-five percent of the South African population that is considered to be vulnerable to food insecurity, the majority of these food insecure individuals are black people who live in the rural former homelands (De Klerk *et al.* 2004). Moreover, in these rural households, poverty rates are exceptionally high, up to 70.5 % compared to only 57.7 % for black, non-agricultural households (Pauw 2007). When these households are considered within this overall context of extreme food insecurity, there are indications that even small agricultural inputs may have considerable value. A recent study of the contribution of subsistence agriculture to local diets in the Limpopo province has suggested that although income is still the primary food security determinant in the region (as it is elsewhere in rural South Africa), various types of subsistence agriculture contribute significantly to household nutrition (Van Averbeke and Khosa 2007). The study found that without the inputs of even very small-scale subsistence farming, the food security of many households would be reduced, especially among the ultra-poor. Besides the obvious value of direct farm-inputs into the diet, in a poor rural communities agriculture is also likely to have secondary benefits to nutrition through the potential for agricultural activity increase the income elasticity of producers (Hendriks and Lyne 2003a; Hendriks and Lyne 2003b), who then are able to supplement their diet with greater numbers of high-nutrient purchased foods.

Thirdly, a body of recent evidence suggests that even though not all rural households may participate in formal subsistence cultivation activities, the vast majority of rural households in South Africa derive some form of nutritional benefit from the harvesting of natural resource products from the natural surrounds (Dovie *et al.* 2002; Shackleton and Shackleton 2004; Dovie *et al.* 2004). These include edible natural resources, which can be consumed directly; and non-edible natural resources – such as thatching grass, weaving reeds, fuelwood and construction wood and poles. Although many local inhabitants generate cash income through the trade and exchange of these products, even for households not directly generating revenue from these goods, the cash-equivalent saving from acquiring products that would otherwise

have been paid for can in some regions equal almost R3000 (US$300) per household per annum (Dovie *et al.* 2004).

In recent years, there has been considerable interest in quantifying the input of wild foods into local diets. In some areas, evidence suggests that the mass and diversity of wild leafy vegetables harvested from rural surrounds can rival (and at times exceed) that of cultivated crops (High and Shackleton 2000). Alternate ethnobotanical studies have also confirmed that most rural households in savanna regions use wild edible herbs (Twine *et al.* 2003), and widespread use of wild leafy vegetables is common in rural areas in the Eastern Cape (Bhat and Rubuluza 2000; Jansen van Rensburg *et al.* 2007) and KwaZulu-Natal (Modi *et al.* 2006; Odhav *et al.* 2007). In recent years, a number of commentators have suggested that wild foods are becoming increasingly important to those afflicted by HIV and AIDS (Dwasi 2002; Mauambeta *et al.* 2002; Mauambeta 2003; Gari 2004; Quinlan 2004; Kayambazinthu *et al.* 2004; Barany *et al.* 2005; Hlanze 2005; Ngwenya and Mosepele 2007; McGarry 2007; Torell *et al.* 2007b). In this thesis, I evaluate the evidence in support of this claim, through exploring the role played by of wild leafy vegetables (Chapter 5) in the food security and nutrition of households afflicted by HIV and AIDS.

Designing food security interventions in the context of HIV and AIDS

In addressing the relationship between household food security and local use of land-derived products in given the context of HIV and AIDS, I endeavour in this thesis to make useful contributions to the debates within South African policy and practice, concerning how to structure and implement food security interventions in the context of HIV and AIDS. Currently, food security policy and programming is strongly driven towards promoting household food security through intensifying local investment in household agricultural production. In 2002, the Department of Agriculture compiled the first Integrated Food Security Strategy (IFSS) for South Africa, which declared its primarily objective to overcome rural food insecurity by increasing the participation of food-insecure households in productive agricultural-sector activities (Department of Agriculture 2002; Hendriks 2005). Moreover, the South African government's much-publicized policy to promote good nutrition and encourage the consumption of a wide range of vegetables as a response to HIV and AIDS has resulted in large numbers of health-care facilities incorporating programmes aimed at promoting agricultural productivity among afflicted households and individuals. These activities are also common among non-governmental organisations, which regularly include agricultural intensification programmes as part of the HIV and AIDS interventions.

While the rationale for encouraging better nutrition among the HIV and AIDS-afflicted is reasonably well established (Haddad and Gillespie 2001; Beisel 2002), there is, however, still very little empirical evidence as to what impact small-scale agricultural activity has on the food security of rural households in South Africa (Hendriks 2003; Van Averbeke and Khosa 2007). Schmidt and Vorster (1995) determined whether or not participation in irrigated vegetable production improved the nutritional status of households, particularly among children in a semi-arid setting in North-West Province. But their results were inconclusive. Kirsten *et al*. (1998) related variables describing agricultural production of households in KwaZulu-Natal to the anthropometric data of household children. They found that agriculture improved the nutritional status of households, but only when production generated substantial monetary income, or when it enabled a substantial reduction in household food expenditure. The reason was that households involved in farming that met either or both of these conditions purchased larger quantities of energy-dense foods, such as fats, oils and meat and also more fruit and vegetables than households that did not farm or households of which the farming did not meet either of these two conditions. These results suggest that the main relationship between agriculture and nutrition is indirect and dependent on the contribution of agriculture to income. From their findings Kirsten *et al.* (2003) concluded that improving agricultural production as a strategy to alleviate poverty and enhance household food security needed to target areas where the natural resources were conducive to successful crop production. Due to the political history of structured racial inequality in South Africa, most areas inhabited by poor, rural black people are not deemed conducive to successful crop production. This conclusion raises doubts that small-scale food production in most rural environments contributes meaningfully to the nutrition of poor South African households.

As reviewed earlier, evidence from other African countries suggests that HIV and AIDS is widely believed to threaten household food security through causing declines in household agricultural productivity, both at a national and household level (Barnett and Blaikie 1992; Shah *et al.* 2002; Du Guerny 2002; Barnett and Whiteside 2002; Hammarskjold 2003; De Waal and Tumushabe 2003; Mather *et al.* 2005; Jayne *et al.* 2005). Although this effect has not been as widely documented in South Africa, there are some preliminary indications that suggest South Africa may be experiencing HIV and AIDS-associated reductions in agricultural productivity at the household level (Drimie 2002; Drimie 2003; Drimie and Gandure 2005; Aliber *et al.* 2006). However, how much are these hypothesized reductions likely to affect a country like South Africa, which has a seemingly limited capacity for household-level agricultural productivity (Kirsten *et al.* 2003), and where there is little understanding as to the role agricultural inputs play in household food security relative to household income (De Klerk *et al.* 2004; Van Averbeke and Khosa 2007)? Or, conversely,

how useful is a policy that prioritizes increasing small-scale agricultural productivity as a means for promoting long-term food security for vulnerable groups, if those who are afflicted with HIV and AIDS are constrained in their capacity to engage in these activities? This thesis seeks to address these questions, through a methodology structured to specifically probe the importance of household-level agricultural productivity to household food security and nutrition, in the context of HIV and AIDS.

Outlining food security monitoring systems in the context of HIV and AIDS

Finally, this thesis is underscored by the urgent need in South African food security policy and programming to clarify how the food security status of South African households should be monitored in the era of HIV and AIDS; and how to incorporate HIV and AIDS-sensitive food security indicators into South Africa's nascent food security monitoring and assessment systems. South Africa is currently unique among the SADC nations, in that it has no nationally representative food security monitoring or assessment system. The reasons for this are diverse, but Hendriks (2005) suggests that efforts have been hampered by the political isolation caused by South Africa's apartheid legacy. As a result, South Africa has maintained a relative independence from international aid-agency led food security monitoring system: such as the Vulnerability Assessment Committee (VAC) system used in other SADC countries, or alternatively, the Food Insecurity Vulnerability Information Mapping Systems (FIVIMS) prevalent in other developing countries.

In recent years, the South African government has made efforts to strengthen their food security assessment framework. The 2002 IFSS has called for empirical research to determine the food security strategies of households under "normal" conditions, identify vulnerable households and monitor the impact of various shocks and stressors (including HIV and AIDS,) on household food security (Department of Agriculture 2002). In the years following the publication of the IFSS, the Department of Agriculture (DOA) made considerable efforts towards reaching these objectives. Foremost of these efforts was an attempt to develop, and pilot, a national-level food South African food security information system. The South African government favoured a prototype that was based on the FIVIMS model (Hussein 2002; Verduijn 2004). This distances the South African approach to that of other SADC countries, who more commonly use the Regional VAC system. Although the FIVIMS and VAC systems share many conceptual and structural overlaps, they are distinct food security monitoring prototypes (SARPN 2004).

In 2005 a pilot was conducted by the DOA in consultation with the Human Sciences Research Council (HSRC) in the Sekhukhune area of Limpopo Province, that made use of the FIVIMS conceptual and methodological framework. A total of 2,773 individuals from 597 households were surveyed, using a survey instrument that used a number of food security indicators: including experienced-based measures of food insecurity and quantitative measures such as dietary diversity.

The FIVIMS pilot was assessed by means of simple descriptive statistics and a more detailed data analysis of the survey was to be subcontracted to a panel of South African academics and experts. However, this process was never completed (S. Drimie, personal comm. Nov 2007). As a result, the FIVIMS data has yet to be subject to advanced statistical analysis which could probe for, among other things, the association of household factors commonly associated with HIV and AIDS (referred to as HIV and AIDS proxies) with household food acquisition strategies. Perhaps because of this, the latest published reports from the South African FIIVIMS project propose that the quantitative survey format of the original FIVIMS pilot be deemphasized in favour of community based food insecurity monitoring systems (CBFMSs) (Banda and NoviAfrica 2007; Banda 2007). CBFSMs are systems based at sentinel sites where community participants monitor and report monthly on an agreed set of indicators. Because these indicators are identified by community-based monitors without formalised household survey instruments, they would be purposely simple in nature: relying on proxy indicators of food insecurity, such as the sole reliance of a household on state-welfare grants for income, or, as is becoming increasingly popular, factors indicating the presence of HIV and AIDS in the household (Banda and NoviAfrica 2007; Department of Agriculture 2007). In order for this method to be reliable, these simple proxy indicators would presumably have to be verified against food security indicators used in national and other household surveys. These survey indicators would in themselves, be understood to be reliable indicators of the true food security status of the household. Given these verification criteria, two important questions arise: first, how reliable are these household survey indicators of the food security status of the household? And second, is there evidence to suggest that simple proxy indicators of, for example, household HIV and AIDS affliction, are associated with specific household food security states?

Theoretically, there are a number of potential problems with the FIVIMS approach. First, there is the issue of the reliability of the food insecurity benchmark indicators. Currently, the DOA has prioritized a series of survey indicators that measure a household's experience and responses of food-resource restriction and hunger (Department of Agriculture 2006; Banda and NoviAfrica 2007; Department of Agriculture 2007). Originally developed in the USA,

these so-called experiential measures have in the last decade become popular in developing country contexts due to their ease of administration and apparent cross-cultural acceptability (Coates 2004; Migotto *et al.* 2005; Coates *et al.* 2006a). Yet, despite the increasingly wide application of these indicators to developing country contexts, there is still considerable doubt as to whether these indicators can be reliably substituted for more laborious, quantitative food security and nutritional indicators (Migotto *et al.* 2005).

Second, there are a number of problems raised by the practice of using simple indicators of household poverty, demographic or HIV and AIDS-status to proxy household food security status. Although household poverty status is commonly used as a proxy for household food security status in developing countries (Hatloy *et al.* 2000; Hoddinott and Yohannes 2002), the usefulness of household demographic and / or HIV and AIDS proxies to target the food insecure is more contested. The use of HIV and AIDS-proxies has been used for food aid targeting in heavily-afflicted regions where specific household HIV and AIDS proxies are known to be associated with heightened food need. For example, a FAO report from Zambia has recommended that households with HIV and AIDS-exacerbated female headedness be targeted for food aid, on the basis of this characteristic alone (FAO 2003d). Generally, however, the practice of targeting vulnerable groups on the basis of the presence or absence of HIV and AIDS variables alone is recognized as being over-simplistic. As FANRPAN (2007, p19) caution in their policy recommendations for integrating HIV and AIDS into food security programming, "The use of the term 'vulnerability' as an absolute status – for example by simply describing chronically ill, or female-headed households, or orphans as vulnerable groups – should be avoided. Vulnerability is not necessarily synonymous with need." As an alternative, FANRPAN (2007) suggest that a livelihoods framework be applied to food security assessments and the interaction of HIV and AIDS proxies with household financial, social, human, physical and natural capital be considered.

While the method of evaluation suggested by FANRPAN is admirably thorough, it must also be acknowledged that this meticulous research methodology can be difficult to apply in resource-constrained developing country contexts. As Devereux and Maxwell (2001) note, information needs are limitless but time and financial resources are limited, so choices need to be made and priorities need to be set to have limited and useful indicators. Like the South African FIVIMS effort, practitioners in resource-constrained contexts are looking for fast, efficient and easily administered indicators. In practice, many of these indicators are incorporated into food security monitoring systems whether they have been validated or not and as a result any empirical investigation which explores the relationship between household food security indicators and presumed food security proxies is of value. This thesis is

concerned with such an empirical investigation, and aims to use the case history data accumulated from the research sites to explore the association between food security indicators and household HIV and AIDS proxies.

HYPOTHESES, KEY QUESTIONS AND OBJECTIVES

Hypotheses

This study is premised on a number of hypotheses or propositions, which are listed below. They were key in guiding the approach, design and methods used in this study and underlie much of the discussion.

1. HIV and AIDS proxies are associated with an increase in household experience of food insecurity and a decrease in household dietary diversity.

2. Due to the negative relationship between HIV and AIDS and household physical and human capital, HIV and AIDS proxies are associated with a decline in the number of dietary inputs from cultivated foods.

3. Due to the safety-net value of wild natural capital, HIV and AIDS proxies are associated with an increase in the number of dietary inputs from wild foods.

4. Due to the negative relationship between HIV and AIDS and household social capital, HIV and AIDS proxies are associated with a decrease in the number of dietary inputs from foods donated by neighbours.

Key questions and objectives

The broad research objectives of the study were to:

- demonstrate whether there is an association between household HIV and AIDS proxies and two alternate household food security indicators, similar to those used in the South African FIVIMS pilot: an experiential measure of household food insecurity, and a measure of household dietary diversity;

- determine the proportions of food derived from non-purchased sources in typical household diets; that is, the proportion of foods derived from purchased, wild, cultivated or donated sources;

- explore the socio-economic and social determinants underlying different food acquisition strategies and assess whether the proportions of the relative alternate food sources differ in HIV and AIDS proxy-afflicted and non-afflicted households;

- outline policy recommendations that seek to clarify the association of HIV and AIDS-proxies with household food acquisition strategies; and

- outline policy recommendations that advise as to the usefulness of the candidate food security indicators for identifying the food insecure.

CONCEPTS AND DEFINITIONS

Food security

The concept of food security is central to this thesis and needs to be defined at the outset. This is necessary, given the degree to which the application and meaning of the term has diversified over the past four decades. Indeed, in the mid-1990s, Maxwell (1996) recorded the existence of more than 250 definitions of food security, which included aspects of addressing food supply, access, adequacy, utilisation, safety and, in some cases, cultural acceptability of food for all people at all times. However, most contemporary discourse on food security usually restricts the definition to three broad aspects: food availability, access and utilisation (World Bank 1985; Hoddinott 1999; Frankenberger and McCaston 1999; Maxwell and Slater 2003).

Early analysts of food security in the 1960s and 1970s were focused primarily on the availability aspect of this definition because they advocated country-level production self-sufficiency as a strategy for nations to achieve food security. Definitions of food security over this time thus focused on aggregate food supplies at national and global levels and, in 1974, a summit at the World Food Conference defined food security simply in terms of macro-availability, or as: “availability at all times of adequate world supplies of basic food-stuffs” (United Nations 1975, p.2).

In recent decades, there has been an increasingly consensual discourse and empirical backing to support the view that there is little correlation between large sets of process indicators that describe area-level food production and household-level food consumption (International Fund for Agricultural Development 1997; Chung *et al.* 1997b). Accordingly, in the mid 1980s, the World Bank proposed the definition of food security that is still used today, which broadened the emphasis from food *availability* to include *access* to food and narrowed the focus from the global and national to households and individuals, or: "access by all people at all times to enough food for an active, healthy life" (World Bank 1985, p.1).

A growing awareness that household-level food access and utilisation are critical components of food security has encouraged the development of more household-focused food security measurement methodologies. This, however, poses many empirical challenges, as household-level influences are far more numerous and varied than measurements at national level and researchers are faced with the task of determining how to capture concisely and effectively the influence of varied and often inter-related influences in household samples. What's more, researchers are often faced with the challenge of operationalising the many components of household-level food security into measurable indices. In this thesis, I focus on the challenges of operationalising (at the household level) the food access and utilisation aspects of food security. By targeting food acquisition (which I define loosely as the sum of food access and utilisation) at the local level, food insecurity is thus envisioned as a livelihood failure at the local or household level, rather than a failure of food production at the national level (Devereux and Maxwell 2001).

Food access generally examines market trends, price levels and infrastructure as well as the amount of relief aid available at the local level. Although these institutional and infrastructural frameworks are critical to a holistic food security assessment, they are beyond the scope of this study – which is focused specifically at the household level. However, some aspects of food access are dealt with in this study. Food access also typically examines food security risk and vulnerability given local poverty levels and the livelihoods of vulnerable groups. Through including household socio-economic and livelihood components in this research, as well as drawing on supporting qualitative data that describes livelihood and poverty strategies within households, household-level dynamics governing food access are gauged.

Food utilisation, on the other hand, is generally ascertained through nutritional measures administered at the individual or household level: such as anthropometric measures, serum analysis, caloric intake, and indicators of the variety and diversity of food incorporated into the diet over a given reference period. Food utilisation indicators also increasingly include the

perception of vulnerable groups on future nutritional problems (or so-called experiential food security measures, see Chapter 3 for a more detailed discussion). In a comprehensive food security assessment, several alternate indicators of food utilisation would be measured for the purposes of triangulation. Such a detailed assessment was beyond the scope of this study and only two measures of food utilisation were used, namely: a dietary diversity index based on a household's 48 hr dietary recall and an experience-based measure of household food access (See Chapter 2 and 3 for full details).

Use of the livelihoods framework for food security assessment in the context of HIV and AIDS

The era of HIV and AIDS has added a new dimension of complexity to the already formidable task of operationalising food security assessment and interventions. The challenge for those working to achieve food security objectives is, simply stated: how can we mainstream the effect of HIV and AIDS into current (or nascent) food security assessment, monitoring and intervention systems? Time and again, HIV and AIDS issues top the agenda in food security policy and programming, but current southern African food security monitoring systems have mostly only incorporated HIV and AIDS effects in a "cursory manner" (SARPN 2004, p.41). Accordingly, it has been broadly acknowledged that building a food security component into AIDS research and reaction is at present hampered by a lack of appropriate food security indicators (SADC FANR VAC 2003, 2004; Gillespie and Kadiyala 2005; Hendriks 2005).

As discussed earlier, food security indicators are usually broadly categorized according to the scale at which food supply is quantified: namely food availability (national or global scale), access (community) or use (household or individual). In developing countries, food security interventions are frequently targeted at the household-level, and aim to increase food utilisation and access. Accordingly, nutritional measures of household (or individual) food intake are most usually relied upon to track the success of local food security interventions. However, as SARPN (2004) and Devereux *et al.* (2004) note, that while nutritional indicators are critical to the development of food insecurity information systems, nutritional indicators in isolation are also severely limited in that they place little emphasis on describing the livelihoods of the food insecure and thus cannot assist in understanding the causes of food insecurity. Methods are thus required that describe the livelihoods and food acquisition strategies of the food insecure.

One way researchers could reconcile the limitations of nutritional indices in food security assessment is to integrate nutritional data with livelihoods information, that is; combine nutritional status data with contextual information on livelihoods, including livelihood activities, assets and coping strategies. The Sustainable Livelihoods Framework (SLF) has been proposed as a theoretical and analytical tool through which nutritional indicators might be paired with livelihoods information in this way (Hussein 2002; Devereux *et al.* 2004; SARPN 2004; Masanjala 2006). In this thesis, I propose that the Sustainable Livelihoods Framework (SLF) (DFID 1997) is a particularly useful framework for operationalising food security measurement in the context of HIV and AIDS. Developed by DFID in the late 1990s, the SLF is a holistic, asset-based framework for understanding poverty and the work of poverty reduction. As an asset-based model, the SLF focuses attention on developing the underlying resources and capacities needed to escape poverty on a sustainable basis. The model places emphasis on the critical mass of assets needed to cope with stresses and shocks over time. Specifically, the SLF is notable for the acknowledging that everyone has assets on which to build their long-term well-being. These assets range from a more traditional econometric definitions (e.g., specifically financial assets), to a wider set of less commonly-defined assets (e.g., personal, cultural, social or political). In this way, the SLF framework has become synonymous with the so-called "asset-pentagon" of financial, social, human, physical and natural capital.

The SLF has been widely applied to poverty and development work, but recently there has been a growing consensus on the usefulness of livelihoods approaches for assessing, monitoring and mapping food insecurity and vulnerability (Hussein 2002; Devereux *et al.* 2004). The concept of food security and the sustainable rural livelihoods framework share many common features that point to strong conceptual overlaps, as both approaches disaggregate via agro-ecological zones or food economy zones, and demographically vulnerable groups. There is also a common emphasis on well-being over time, access to food and incomes, and a demonstrated concern with risk, vulnerability and coping strategies (Devereux *et al.* 2004).

In this thesis, the SLF is used in order to structure the methodological framework, which is elaborated in the section which follows. At all times, efforts are made to pair nutritional indicators with a livelihoods approach, – with particular emphasis on natural capital and social capital networks.

Defining the spatial and temporal scale of research

As this research was primarily concerned with the so-called household-level impacts of HIV and AIDS on livelihoods and food security, the spatial scale of empirical investigation was defined, at the outset almost by default as "at the household-level". This scale of investigation was defined by both convention and convenience: the sustainable rural livelihood framework is relevant at the household level, and HIV and AIDS and food security indicators that guided the study methodology (see Chapter 2) were all modelled on a household-level approach.

Notwithstanding the usefulness of a household-level study, it is also useful to note that a number of key commentators have called for more research into the impacts of HIV and AIDS at the village, or community level (Mutangadura *et al.* 1999; White and Robinson 2000; Gillespie *et al.* 2001; Barnett and Whiteside 2002; Bell *et al.* 2006). Explicitly incorporating a measure of community-level dynamics has recently featured in a number of studies exploring household level food security and HIV and AIDS, to good effect (Martin *et al.* 2004; Jayne *et al.* 2006). Broadening the scope of enquiry from the household to community-level also encourages a model that incorporates the linkages between rural, urban and peri-urban areas (White and Robinson 2000; Barnett and Whiteside 2002; Jayne *et al.* 2005).

As a result of these considerations, the decision was made to conduct research in three distinct research sites; with very different socio-cultural, economic and environmental characteristics. In this way, analysis could adjust for site-specific trends and characteristics. Efforts were also made to account for the effect of inter-household migration on household livelihoods, through extending the temporal scale of the research to a 12-month, longitudinal assessment period which allowed for the recording of changes in household demographics and income levels over the research period.

Defining a household

Much could (and has been) said of the complexities involved in defining a household unit in African communities. Polygamy was not uncommon in the study sites and many 'households' were actually composite dwellings comprised of extensive family networks. Despite the fact that these kinship groups technically "slept under the same roof" (which is the functional

definition sometimes given for a household (Barnighausen *et al.* 2007)), these kinship sub-groups also managed their own finances and ate their meals at separate hearths. Given these considerations, I found it more useful to define as household as: all of the people who mostly consume meals together, or "share the same kitchen"

People currently absent from the household, but who (when visiting) ate their meals with the respondent were also included as absent members in the household profile. In order for a person to be included as an absent member of the household, they had to be sending at least annual remittances to the household, or be staying in the household for at least four weeks of the year.

STRUCTURE OF THE THESIS

The empirical basis of this thesis is drawn from case-studies of local-level food acquisition strategies in three sites of rural South Africa. Chapter 1, the current chapter, introduces and sets the context for the study; providing insight into the background, discourses and practicalities that influenced the study from both an international and South African perspective. Chapter 1 also provides a conceptual framework and explains and defines key concepts and terms. The review of the literature in this chapter was purposely kept short and concise, focusing on research trends and perspectives. Other details are presented in the introductory sections of each component chapter and in the discussions.

Chapter 2 outlines the HIV and AIDS context in South Africa and offers a description of the study area. The pilot conducted as a prequel to the main body of research that forms the empirical basis of this thesis is briefly discussed in this chapter. Methods and data management techniques for the main body of research are then discussed.

The results chapters are Chapters 3, 4, 5 and 6. Chapter 3 provides a very broad perspective on typical dietary composition and the food-security status of households in the study sites. Quantitative analyses are used to explore whether there is evidence for a relationship between household HIV and AIDS status and the dietary composition of households as well as overall household food security status. Chapter 3 is concerned at a broad level with the question of how HIV and AIDS is associated with overall household income, household food security and dietary composition, Chapters 4, 5 and 6 follow on for the general trends explored in Chapter 3, through exploring at a more refined level of analysis the contribution of diverse food acquisition strategies to the composite food security perspective offered in Chapter 3. This is done through qualitative and quantitative means, which draw on targeted methodologies to

exploring how HIV and AIDS affects the manner in which food is acquired through diverse food acquisition strategies. Specifically, the relationship between HIV and AIDS and use of cultivated foods (Chapter 4), wild foods (Chapter 5) and food acquired through donations from friends and relatives (Chapter 6) are discussed.

Chapter 7 provides a synthesis of the four preceding results chapters. Each site is considered in detail and the overall picture of how households are drawing on diverse livelihood capitals in responding to HIV and AIDS within three distinct contexts is drawn. Chapter 7 also reflects on the lessons learned in terms of the usefulness of the food security indicators to detecting food insecurity in HIV and AIDS-aggravated contexts. Recommendations for food security monitoring and interventions are made.

Chapter 2. Sites and Methods

INTRODUCTION

This chapter provides an overview of the research activities upon which the empirical content of this thesis is based and the research sites in which the study was conducted. The research was divided into two phases. A first phase comprised a pilot, in which research sites were selected and research priorities and methodologies were developed. The pilot was conducted in the 9-month period from March 2005 to November 2005 and comprised qualitative methods in the form of focus groups and interviews, as well as quantitative piloting which took the form of a cross-sectional household survey administered to 571 households in four pilot sites.

The second phase of research was conducted over the period from October 2006–January 2008 in three of the four sites originally piloted in the first pilot phase. Phase two was designed and implemented as a series of repeat households visits, each of which had quantitative and qualitative components, to 307 purposely selected households at regular 3-monthly intervals over a total 12-months.

Although these repeat assessments in the second phase were in a sense 'longitudinal', the data collected from the second phase should not be confused with longitudinal, or panel-type data. There are a number of reasons for this. Firstly, the lag-period between assessments of three months were much shorter than the typical lag period for panel data, which generally is at least a year in duration. This is a major limitation if longitudinal analyses is to be conducted, if changes in household socio-economic and food security status are gradual. Secondly, events of interest that would have lent themselves well to longitudinal analyses (that is, mortality and fostering of new dependents during the assessment period) occurred among too small a sub-sample of households to make statistical analyses possible. With such a small sample-size, these households were best analysed qualitatively. This has been done throughout this thesis through the use of case histories.

While not been truly longitudinal in nature, this study-design is not strictly cross-sectional either. Through summing repeat measures over a 12-month period, the study sought to achieve a higher degree of reliability from the survey instruments, as well as a greater richness of information from the households as derived from qualitative means. However, this

repeat-assessment process also brings with it added challenges in the areas of logistical and data management, as well as data processing and analysis, which are thoroughly discussed in the methods sections in this chapter.

SITES

At the commencement of this piloting period, no candidate sites had been specified or selected. A list of selection criteria wascompiled based on the broad study objectives (Chapter 1):

- representativeness – three distinct sites, each representing rural areas with distinct socio-cultural, geographic and agro-ecological zones;
- high HIV and AIDS affliction – defined in this study loosely as having antenatal prevalence rates at least 30 % higher than the national norm, which was 22 % in 2005–2006 (Dorrington *et al.* 2006);
- high levels of food insecurity and poverty, defined as being above the national average, according to municipal-level statistics in the prospective sites;
- good local Non-Government Organisation networks in the candidate region, who would ideally act as research collaborators and advisors in the project; and
- logistical suitability – willingness of the community to engage in research and physical accessibility of the sites given study transport and time restrictions.

A list of nine potential sites in the Eastern Cape and neighbouring KwaZulu-Natal was compiled. Following nine months of site reconnaissance and piloting in four of these original nine sites in 2005–2006, the following three sites (see Figure 2.1) were selected.
1) Mt. Frere district in the Eastern Cape,
2) KwaDlangezwa region in Zululand, KwaZulu-Natal,
3) Nkandla district in KwaZulu-Natal

A fourth sitewas the Msunduzi region of KwaZulu-Natal. Msunduzi was deemed the most expendable of the four pilot sites, due to the high levels of crime in the area. A strategic decision was thus made to drop the Msunduzi site after the pilot.

Figure 2.1. Detail of the three study sites. Site locations marked with a red square.

A summary of the descriptive statistics for each site, as derived from both the pilot and the second phase of research, are provided in Table 2.1. Detailed site descriptions follow.

Table 2.1. Household descriptive statistics for key household socio-economic variables, at each site, in the pilot and second phase. Second phase values show average household score after four assessments.

	Pilot (n=575)			Second Phase (n=307)	
	Mean	Std.dev		Mean	Std.dev
Earned Income (rands per month)					
KwaDlangezwa	2,428	3,757		1,503	2,524
Nkandla	660	1,187		1,115	1,774
Mt. Frere	894	1,788		1,440	2,924
Grant income (rands per month)					
KwaDlangezwa	652	752		1,017	685
Nkandla	985	729		1,016	855
Mt. Frere	681	651		989	792
Total Income (rands per month)					
KwaDlangezwa	2,853	3,580		2,520	2,592
Nkandla	1,564	1,364		2,075	2,109
Mt. Frere	1,580	1,825		2,429	2,903
Average education category of adults (over 18)					
KwaDlangezwa	3.6	1.1		3.2	1
Nkandla	2.9	0.9		3.1	0.9
Mt. Frere	3.1	1.4		3.3	1
Size of HH					
KwaDlangezwa	8	3.6		7.3	3.2
Nkandla	7.8	3.6		7.6	4.3
Mt. Frere	5.4	2.8		5.4	3.2
Ratio income: person					
KwaDlangezwa	449	802		401	432
Nkandla	225	209		380	330
Mt. Frere	337	469		682	955
No. of children 0–18yrs					
KwaDlangezwa	3.7	2.5		3.7	2.3
Nkandla	4	2.5		3.9	2.9
Mt. Frere	2.3	1.8		3.1	2.4
No. of adult females					
KwaDlangezwa	2.7	1.5		1.9	1.3
Nkandla	2.2	1.2		2.3	1.5
Mt. Frere	1.9	1.3		1.5	1.1
No. of adult males					
KwaDlangezwa	1.9	1.6		1.6	1.3
Nkandla	1.8	1.5		1.7	1.3
Mt. Frere	1.4	1.2		0.9	1
No. of absentees					
KwaDlangezwa	not recorded			0.8	1.2
Nkandla	not recorded			0.8	1.3
Mt. Frere	not recorded			2.9	2.5

Mt. Frere

The village of Moloweni (30° 55' 0S, 28° 58' 60E) is located some 6 km east of the town of Mt. Frere, in the Umzimvubu district of the Alfred Nzo municipality, in the Eastern Cape Province. Residents are mostly of Xhosa ethnicity and speak IsiXhosa. Population density for the district averages 32 people per square km (Alfred Nzo District Municipality 2007). As a former apartheid homeland of South Africa, more than 99 % of the population is classified as black and land is communally accessed and administered under tribal tenure on behalf of the state.

The vegetation in this area is classified as east Griqualand grassland (Mucina and Rutherford 2006). The region is located on a plateau, ranging between 1,200 and 1,400 m above sea level. Figure 2.2 depicts the grassy, mountainous terrain of Mt Frere, where decades of communal-access land management have resulted in a deeply gullied, eroded landscape. Summer temperatures range between 10 and 35 ºC and in winter mean temperatures range between -1 and 18 ºC. The area experiences summer rainfall, with average precipitation of just 650 mm. This puts the site on the borderline for rain-fed maize production, which is considered to be 600 mm (Department of Agriculture 2002).

Figure 2.2. In spring, seasonal planting of maize, potatoes and other vegetables for subsistence purposes transforms the landscape.

Remote from South Africa's industrial and commercial centres but with a history inextricably tied to them, Mt. Frere epitomises the interrelatedness of urban and rural poverty and economic development in South Africa. It is a deeply impoverished and deprived area: a survey of 746 households conducted by the Chronic Poverty Research Institute in 2002 (De Swardt 2004) showed that 97 % of households reported private consumption expenditure below a monetary poverty line of R560 (US$53) per adult equivalent per month. Official government figures report 39 % of households survive on state welfare grants alone. Given this, it is not surprising that 23 % of households surveyed in 2002 reported experiencing food insufficiency "often", while some 83 % of households had too little food at some point during the previous year. At the time of research, the official rates of unemployment (77.58 %) and of dependency (4.14) were significantly higher than the average provincial rates (55.41 % and 2.51, respectively) (Alfred Nzo District Municipality 2007).

Local infrastructures are poor. At the time of research, the village of Moloweni was without electricity, refuse removal or flush-toilets. Water was accessed from a number of communal taps located in central points throughout the village. The village was, however, located near to a community junior and high-school. The nearest medical facility was the Mt. Frere hospital, in Mt. Frere town.

Within the study site, HIV and AIDS prevalence amongst antenatal clinic attendees was higher than provincial averages: in 2003, HIV prevalence in the Alfred Nzo district was estimated at 31 % (McCann 2005), compared to 27 % for the province in 2003 (Dorrington *et al.* 2006). More recent figures released by the Department of Health have, however, suggested a dramatic decline in antenatal prevalence, with estimations for Alfred Nzo dropping from 25.1 % in 2006 to 21.8 % in 2007, compared to a district prevalence of 28.6 % in 2006 and 26 % in 2007 (Figure 2.2). A recent commentary by Dorrington and Bourne (2008) in the *South African Medical Journal*, however, has questioned the validity of the methodology used to derive these statistics, suggesting that this apparent "levelling off" should be regarded with caution.

At the heart of the region's poverty lies the Eastern Cape's history of systematic underdevelopment in rural employment, productivity and infrastructure. The formal economy in Mt. Frere has, by and large, failed to provide adequate employment and livelihoods. For many generations, the mining economy underpinned labour migration from the region. Though mining has declined in economic vigour, migrancy continues to link the Mt. Frere region to distant urban locations in Durban, Port Elizabeth, Johannesburg and Cape Town, though prospects for employment are uncertain. Between 1991 and 1999, 150,000 jobs were lost in the mining sector; 110,000 jobs were lost in the manufacturing sector and 100,000 in the building sector (Casale 2004). Migration pattern trends are shifting towards a female, rather than male, bias (Posel and Casale 2003; Casale 2004). As a result, Mt. Frere had the highest rate of absenteeism of all the sites. Rural area jobs that did exist were predominantly in the local service sector and access to these is often controlled by a local political elite. The town of Mt Frere itself offers little prospect of local employment. The town is dominated by a Spar Supermarket, which repackages and sells its commercially grown staples in standardized bulk hampers of maize, sugar, flour, potatoes, oil and so on, which are designed to feed a household for a month for the lowest possible financial outlay (typically in the region of R320 or US $35). A plethora of stores and road-side stands vend telephony products and services, whilst a community of West-African street-vendors dominate the sale of Chinese-import clothing, electronics and accessories along the roadside. A number of local women vend potatoes, onions and other consumables – which are partly repackaged from commercial suppliers and partly seasonal excess from domestic cultivation efforts. National banks, commercial life assurance groups, burial societies and fast food outlets occupy the rest of the street.

In a commentary on the dynamics of poverty in the Mt Frere district, du Toit *et al.* (2007) suggest that, contrary to the notion that poverty in rural South Africa arises out of the lack of

connection with the first world economy, part of the problem may well be the depth and strength of the connection. While there is economic activity in Mt. Frere town, which services the surrounding villages, small local rural service industries are almost invisible in the landscape, while the scant profits of much local trading effected through the aforementioned stores and institutions are expatriated to the coffers of national monopolies, parastatals and corporate players. Access to the local economic opportunities that do exist is jealously guarded. What stable and secure livelihoods there are in the area are those linked to the state and local government. In turn, access to these is governed by a local elite that is both traditional and political.

In the absence of an adequate formal economy, land-based livelihoods are vital, yet also fragile and marginal. In the 2002 survey cited earlier, while 87 % of households reported access to some kind of productive land, only 6 % reported raising any kind of income from it and 87 % of households were reliant on store-bought maize meal throughout the year (du Toit 2005). The pilot conducted in 2006 found that although 84 % had access to productive land only 4 % reported selling cultivated produce.

The low commercial potential of the land in terms of agricultural outputs may in part be compensated by the utility of the land from non-cultivated sources, which can be considerably higher than the figures cited earlier for sales generated from formal on-farm production. In the region studied, this study found 21 % of households sell grass hand brushes and 17 % sell woven sitting mats. Most households also keep livestock. In Moloweni, 55 % of the households surveyed had a mean number of 6.5 (± 9.7) chickens, 27 % had a mean herd of 6.4 (± 7.2) cattle, 30 % had a mean herd of 6.4 (± 6.6) goats, 19 % had a mean number of 1.8 (± 1.7) pigs and 14 % had a mean flock size of 12 (± 9.7) sheep.

Nkandla

The village of Mahlayizeni (28° 37' 0S, 31° 4' 60E) is located in the north-east section of Nkandla district, on a high mountainous escarpment overlooking a valley where the Ntumbeni River joins the Mhlathuze River (Figure 2.3). The district of Nkandla is one of great cultural and historical importance to the Zulu people. A number of Zulu kings are buried here and many prominent Zulu politicians (such as Jacob Zuma) have their traditional residences in the region. About 98 % of the land belongs to a tribal trust called the Ingonyama, which is presided over by 18 chiefs *(amakhosi*) from the 18 sub-districts.

Nkandla is a high-lying area where altitudes reached 1,300 m in the study site (Figure 4). Temperatures can reach -5 ºC in winter, but typically temperature ranges between 12 and 27

ºC in summer and -1 and 18 ºC in winter. The area receives good summer rainfall of between 1,000 mm to 1,200 mm per annum and on most mornings a thick mist-belt flanks the upper regions. The dominant natural vegetation pattern is secondary grassland, classified as northern Zululand sourveldt, which is dominated by unpalatable Ngonigoni grass (*Aristida junciformis*) (Mucina and Rutherford 2006). Bush-filled valleys are found at lower altitude, but were absent from the research site. Forests are located on cliff faces, where they are protected from veld fires. These include the Nkandla Forest Reserve– an afromontane forest located approximately 15 km from the study sites.

Nkandla town, located in the centre of the district and some 20 km south-west of the research site, is considered the primary development node. The town itself offers few employment opportunities. Of those fortunate enough to have permanent employment in Nkandla, 48 % are engaged by local government, whereas trade (21.3 %) and transport (13.3 %) dominate the other sectors. Thus, far from being a commercial centre, most of Nkandla town is dominated by the local hospital, tribal council, municipal buildings and derelict residences. A single supermarket sells bulk packages of only the most basic of commodities, refined and processed into their most economical form. Bread and meat are mainly processed, and fresh produce and dairy products are severely limited. Even if residents had the financial means to diversify their diets, the food access aspects of food security must be considered severely restricted in Nkandla (see definition of food security, Chapter 1).

Figure 2.3. A field assistant approaches one of the households under assessment in Nkandla. The mountainous landscape in the background is typical of the region.

The Nkandla site is markedly more socio-economically homogenous than the other research sites. Household income distribution had a very low variance and, in a 2005 quality-of-life survey, almost all (88 %) of the households sampled in the Nkandla district survived on less than R2,500 (US$ 250) per month, 10 % reported incomes of below R3,500 and only 2 % fell into the R3,500–5,000 category (uThungulu District Municipality 2007b). Although the site had access to electricity, only 6 % of the households surveyed made use of it. As with Mt. Frere, none of the household surveyed had flush toilets or running water in the household and water was accessed through collection from central watering-points. Roughly half of the households owned livestock. In the study site, 58 % of the households surveyed had a mean number of 9.6 (± 6.4) chickens, 43 % had a mean herd of 6.6 (± 5.8) cattle, 22 % had a mean herd of 7.2 (± 5.9) goats. Sheep and pigs were not kept.

In Nkandla, households are remarkably similar in appearance and have few outward markers to distinguish households on the basis of wealth or social status (Figure 2.4). Most homesteads consisted of clusters of rounded (*rondavel*) dwellings, built of mud-brick and thatch. These household clusters were referred to locally as *imisi* (pl.). Each *umusu* (sing.) usually comprised a household-head and his or her extended family networks. A number of the *imisi* clusters comprised polygamous kinship groups, with a single (male) household-head, but had separate homesteads for each of his wives and their children. Adjoining *imisi* were usually more distantly related along blood-lines and many of the *imisi* in the survey area bore the same surname, to the extent that large sections in the village were often referred to by locals and us by the name of the families that dominated the area, such as *KwaBiyela* or *KwaMajola* ("*Kwa*" meaning *place of*).

Figure 2.4. Households are relatively homogenous in physical structure.

The cluster-style collections of huts, comprising an *imisi* of many kinship-linked homes (and hearths) are typical.

Nkandla was selected as a research site for a number of reasons. Firstly, there was the issue of HIV and AIDS prevalence. In 2007, Nkandla had an estimated population of some 166,000 people and a population density of 72 people per square km (Census 2001, cited in uThungulu District Municipality 2008), of which 26,000 (15.7 %) or just under 11 people per square km, were believed to be infected with HIV (Dorrington *et al.* 2006). Antenatal prevalence was 34.6 % in 2006 and 36.0 % in 2007 (National Department of Health 2008). In popular culture, Nkandla has become synonymous with the HIV and AIDS tragedies of rural South Africa. An emotionally charged BBC documentary shot in 2003–2005 entitled "Orphans of Nkandla" highlighted the plight of the Nkandla district, allowing viewers to "witness human tragedy unfurl against a backdrop of vast landscapes and rustic poverty." (HBO documentary films 2006). Certainly, the lack of infrastructure and services in Nkandla district makes the human tragedies associated with HIV and AIDS particularly palpable. In the village where research was conducted, the primary school which services the local community housed fifteen orphaned children, who lived without adult supervision in the school's science laboratory, which had been converted into a ramshackle dormitory for these purposes.

Nkandla was also an interesting site for a rural livelihoods study due to its reportedly high agricultural potential (Cairns and Lea 1990; Taylor and Cairns 2001; uThungulu District

Municipality 2007a). The mean plot size for the district is reported as 15,000 m^2, but the 2006 pilot found generally much lower mean plot sizes in the region of 8,000 m^2. Overall, 44 % of the district area is classed as "arable land" and 27 % has apparently "high potential soils". This has led to the suggestion that the area is currently "under-utilized" (uThungulu District Municipality 2007a). Water supply is also reasonably good in the area: there were a number of small rivers running through the subregion and the Mhlatuze River bordered the north-eastern side of the study site. However, most households have no means of accessing these supplies themselves, and rely on municipal pumps for irrigation. In the study site, a single municipal wind-pump serviced the village, but access to this was dominated by local co-operatives (Figure 2.5).

The supposedly high agricultural potential of Nkandla has for decades resulted in the region being flagged for government and non-government interventions aimed at increasing the agricultural productivity of the district (Lyne and Ortmann 1992; Van Rooyen and Nene 1996; Kirsten *et al.* 1998; Taylor and Cairns 2001; uThungulu District Municipality 2007a). However, the same problems cited as limiting the success of these projects in the 1980s (Lyne and Ortmann 1992; Van Rooyen and Nene 1996), such as the unavailability of inputs (seeds and fertilisers), access to credit, the lack of suitable produce markets and transport, inadequate infrastructure to access available water supplies and a shortage of extension and training services; are still cited in more recent project reports (Taylor and Cairns 2001; uThungulu District Municipality 2007a; uThungulu District Municipality 2008), and an independent review has suggested that the expansion of farming based on traditional crops – maize, beans and potatoes – is unlikely to make a significant contribution to poverty alleviation (Taylor and Cairns 2001, p.9).

Nonetheless, a government study conducted in the Nkandla district by Kirsten *et al.* (1998, p.574), which described itself at the time as "a first attempt to consider household agricultural data and nutritional data together in the South African context", suggested that agricultural activity significantly increases the nutritional quality of household diets, as determined by child anthropometric status of households with and without cultivation in the region (Kirsten *et al.* 1998). Taylor and Cairns (2001, p.1) placed a similar importance on subsistence agricultural inputs and attributed as much as a third of household food in Nkandla to subsistence sources. In 2005, Nkandla was incorporated as part of the "massification project of the Agrarian Revolution" and local government intervened to plough and plant-out food security programmes (see Figure 2.5). In the year of research, however, these programs were subject to massive failure due to prolonged drought in the area. In March 2007, the KwaZulu-Natal MEC for Agriculture and Environmental Affairs personally visited Nkandla, in order to

express sympathy, offer up prayers and hand out food aid packages designed to ameliorate the "crippling impact" that the drought was anticipated to have on local food security (Department of Agriculture and Environmental Affairs 2007). Indeed, household expenditure on food in Nkandla is markedly high and ranges between 42 % and 45 % of total household income. This is at least 10 % higher than the mean food expenditure in the district in which KwaDlangezwa falls (uThungulu District Municipality 2007b) and suggests that the importance of agricultural inputs may be inflated.

Figure 2.5. Most *imisi* have their own maize field, but co-operative gardens like the one pictured above, in early spring 2007, are not uncommon.

KwaDlangezwa

KwaDlangezwa (-28.7500, 31° 53' 60E) falls within the Uthungulu district municipality, in north-eastern KwaZulu-Natal province. Like Nkandla, KwaDlangezwa is dominated by people of Zulu ethnicity. Located nearly 600 km north-east of Mt. Frere and about 200 km north-west of KwaDlangezwa, the settlement of KwaDlangezwa offers a distinct cultural, economic and geographic contrast to the other sites.

Whereas the landscapes of Mt. Frere and Nkandla are mountainous grassland, the landscape of KwaDlangezwa is coastal and subtropical. The terrain is lightly undulating, forming the drainage basin of the neighbouring Umhalthuze River. The region is classified as coastal bushveld/grassland (Mucina and Rutherford 2006), but intensive sugarcane and eucalyptus plantations throughout the region mean that there are very few bushveld or grassland areas remaining. Riparian vegetation, which in its natural state comprises lush coastal woodlands, has typically been impacted right up to the stream banks and the only vegetation communities occur in and around drainage lines. The climate of the area is humid and mild; rainfall falls throughout the year and often exceeds 1,000 mm per annum. Temperatures rarely drop below 5°C. As with all the sites in this study, land is held in tribal tenure and utilized by households with private lease-holds.

Unlike Nkandla and Mt. Frere, which are characterized by their isolation from major industrial centres, KwaDlangezwa falls within 20 km of the major industrial centre of Empangeni to the north and within 40 km to the north-east is the coastal town of Richards Bay, which is home to a thriving slag-mining industry, paper pulp mill and harbour. Both of these industrial centres are flanked by affluent leafy suburbs, with a plethora of malls, parks, schools, golf-courses and entertainment centres. Previously designated as "whites only" areas, these residences still largely reflect the racial stratification of the past and remain primarily white-owned. Bordering these industrial and residential areas, the lush subtropical landscape is characterized by private sugarcane plantations and state eucalyptus forestry; these farms and plantations are clearly visible along the major coastal highways. Conveniently bypassed by the national road, some 15 km south of Empangeni, is the sprawling settlement of KwaDlangezwa. A short detour along one of the many dirt roads that cut west off the old national road from Empangeni to Durban will take you into this region.

In many ways, this area epitomizes a South African rural region in flux. Historically, areas such as KwaDlangezwa were sparsely populated tribal lands, a repository for the small, but vital supply of black farm-labour needed to drive the plantation and sugar-cane industries. Since 1969, when Richards Bay was a fishing town of some 200 inhabitants, the city alone had expanded to an estimated 117,000 people in 2001 and is currently considered the most rapidly expanding industrial centre in South Africa (Census, 2001, cited in uThungulu District Municipality 2008). KwaDlangezwa in turn has become a catchment area for these growing industrial centres. Thus, although technically designated as a "rural" settlement-area, with an overall population density for the region of 363 people per km ^{2} (Census, 2001, cited in uThungulu District Municipality 2008), KwaDlangezwa is both rural and overcrowded.

The rapid industrial expansion of the area is reflected in local livelihoods. Although it is primarily mining that drives Richards Bay's industrial growth, the metallurgical processes that dominate slag-mining are not as labour-intensive as below-ground operations and less than 5 % of employed adults in the region are engaged in the mining sector. Government jobs (37.5 %) dominate the few employment opportunities, followed by trade (15.7 %), agriculture (11.6 %), manufacturing (9.75 %) and construction (7.78 %) (uThungulu District Municipality 2007b). For the most part, however, KwaDlangezwa is characterized by high levels of unemployment (over 50 %) and correspondingly high levels of poverty: over 70 % of households survive on less than R350 per person per month (uThungulu District Municipality 2007b).

This area is also characterized by very high levels of HIV and AIDS. Antenatal prevalence in KwaZulu-Natal is considered the highest in South Africa, at around 40 % (Dorrington *et al.* 2006). In the KwaDlangezwa region, official National Department of Health statistics placed antenatal prevalence at 36 % in 2007 (National Department of Health 2008). The uThungulu District Municipality Integrated Development Plan for 2007/2008, however, cited an antenatal infection rate of between 43 and 44 % in 2007 (uThungulu District Municipality 2008). In the Ngwelezane hospital, which services the research area, some health workers suggest antenatal prevalence rates of up to 60 % (B. Bennet, personal comm. May 2007).

As the population has grown in KwaDlangezwa, the land available to households for agrarian activities has become increasingly fragmented as new allotments are created for the ever-expanding population. In KwaDlangezwa, access to land is determined by tribal authorities and a household's position in local political networks is critical here. So-called "newcomers" (of which there are many in KwaDlangezwa) are unlikely to acquire land without considerable social and political networking. Most of the available agrarian (and potential grazing) land is dominated by small sugar-cane plantations, which are managed by a local elite of well-connected local families (Figure 2.6). Due to the prevalence of intensive sugarcane farming in the area, there is little scope for large domestic livestock. In the study site, only 4 % of the households surveyed owned cattle, with a mean herd size of 4.42 (± 4.57). Other large livestock was not kept, although 48 % owned chickens, with a mean coop size of 7.6 (±5.2).

Figure 2.6. KwaDlangezwa in early summer, October 2007. The sugar-cane fields that dominate agrarian activity in this region are clearly visible. Households are usually scattered in the tree-lined areas that border the fields.

Although sugar-cane plantations dominate the land in KwaDlangezwa, it is notable that the overall proportion of households who manage and reap benefits from these fields is quite low (8 %, according to the pilot). For most households, agrarian activity was restricted to a small area in their yard, with a mean plot size of 120 m^2. Most households who owned sugarcane were reluctant to disclose the size of their plots and the amount of revenue they derived from these endeavours. However, from my own field estimations, as well as discussions with local tribal authorities, it would appear that the sizes of sugar cane plots typically range between 1 and 10 ha, although a few families owned upwards of 15 ha.

For those who have access to sugar-cane fields, the annual revenue from these areas is an exceptionally important form of income. The yield of these fields is generally 60–100 tons per hectare for commercial operations, but the sugarcane in KwaDlangezwa is significantly less productive than this, usually yielding closer to 40 tons per hectare (G. Hill, personal comm. June 2006). When sold, sugarcane may yield up to R100 per ton, although poorer quality cane can generate only half of this. According to informants, this revenue is commonly used to pay for building of households, traditional or ceremonial expenses and university fees for their children (who usually attend the nearby University of Zululand). However, these benefits are apparently not equitably shared among the community and are

more likely to be reaped by those households classed in higher income categories. For example, in the second phase of research, only ten (10 %) of households said they owned sugar-cane fields and, of these, only 7 % were being actively cultivated at the time. Of these seven actively-cultivating households, six had mean household incomes above the site median. The remaining 3 % who were not actively cultivating had abandoned their sugar-cane fields due to lack of labour, finances, or both. While the relationship between the income from sugar-cane harvesting and HIV and AIDS is one of interest and importance, the small sample-size of households engaging in this study, coupled by the restriction of this particular phenomenon to just one of the three sites, took this investigation beyond the scope of the current study.

The high wealth-disparities in the region made for a highly complex research area that exemplifies the structural and economic inequalities that define many parts of South Africa. KwaDlangezwa was home to some of the most affluent research subjects in the study, but it was also in this site that some of the poorest and most desperate households were to be found. As a result, dwellings were also very heterogeneous in appearance. Homes ranged from modern-looking households with tin roofs, plastered walls, their own taps and electricity (found in 25 % of households, Figure 2.7); to tiny one-roomed abodes roughly assembled from stones, mud and thatch (Figure 2.8).

Figure 2.7. KwaDlangezwa is characterized by marked socio-economic heterogeneity. Shown above is an example of a more affluent household.

In KwaDlangezwa, I witnessed scenes of poverty and desperation, not comparable with the situation seen in Nkandla and Mt. Frere. This vulnerability was rendered even more acute by the social fragmentation in the region. Crime in KwaDlangezwa was very high and incidents of violence (such as fighting and feuding) were commonly reported. There was also higher evidence of alcoholism in this site, relative to the other sites. This fragmentation may have made households more vulnerable to the negative impacts of HIV and AIDS, as household members were more likely to move in and out of the village following shock events. In KwaDlangezwa three households were dissolved over the assessment period due to HIV and AIDS mortality. In all other sites, dissolution was attributable to other factors; such as migration to look for work, or assimilation of the household into another residence due to marriage. I also saw a number of households comprised solely of a young (under 35), single-woman and her children (Figure 2.8). These women appeared to dwell in the village with few social or kinship networks, struggling to support their children in the absence of child-care support or employment. This phenomenon was unique to KwaDlangezwa; at the two other sites, households were more extended in nature and I did not over the study period find a single, younger woman on her own. This phenomenon made for rich descriptive information in the KwaDlangezwa site, which is incorporated throughout this thesis, but specifically into the chapter on social capital (Chapter 6).

Figure 2.8. KwaDlangezwa is home to a number of households comprised solely of younger single-women and their children. Sithembile (left) lives in her small stone and mud house off the child support grants of her children; Zeliwe (right) is afflicted with HIV and AIDS and cares for her ailing daughter and two other children in her very small house.

SELECTING INDICATORS OF HOUSEHOLD HIV and AIDS STATUS

In both policy and research, the most commonly recognized AIDS indicators are certainly AIDS incidence (AIDS-attributable mortality) and HIV prevalence (extent of HIV infection in given population). These indicators are usually scaled-up directly from an individual-level measure to community and national-level prevalence and incidence. As such, they skip the important intermediate scale of the household, rendering them inappropriate for studies directed at the household level.

As HIV and AIDS incidence or prevalence can only truly be determined at the individual level most studies that deal with the household-level impacts of HIV and AIDS need to engage with the problem of how to gauge the presence of HIV and AIDS in the household. Occasionally, this is done through employment of a highly specialized line of inquiry commonly used in Demographic and Health Survey (DHS) called a "verbal autopsy", which uses a household-level survey to ascertain (within a certain degree of certainty) whether the individuals in the households were afflicted with HIV and AIDS in the period preceding mortality *by proxy* measures. More commonly, however, the level of households HIV and AIDS affliction is established through recording the presence (and describing the effects of) mortality and chronic illness among specific age groups in the household. Key variables that indicate a demographic composition known to be associated with the presence of HIV and AIDS in the household are also commonly used. This *by proxy* approach has been widely applied to household-level studies that address the socio-economic (Topouzis and Hemrich 1998; Booysen 2002; Bachmann and Booysen 2003; Booysen 2004; Collins and Leibbrandt 2007), livelihood (Mphale *et al.* 2002; FAO 2003a; FAO VAC 2004) and food security phenomena (SADC FANR VAC 2003; FAO 2003a; Hunter and Twine 2005; Ngwenya and Mosepele 2007; FANRPAN 2007; Hunter *et al.* 2007) associated with HIV and AIDS.

A series of household-level HIV and AIDS proxies were included in the first (pilot) phase of qualitative surveys, which were administered at random to 575 households in four pilot sites (Mt. Frere, KwaDlangezwa, Nkandla and a site in the Msunduzi region of KwaZulu-Natal, which was later dropped in the second phase). The selective criteria for the HIV and AIDS proxies used in the pilot were adapted from the SADC FANR Vulnerability Assessment Committee guidelines (SADC FANR VAC 2003; Madlala *et al.* 2003). These were (1) presence in the household of chronic (over 3 months) illness of a person aged 0–59 yrs, (2) presence of chronic illness of a person aged 0–59 yrs and receiving free treatment, (3) recent (last 2 years) death in the household of someone between the age of 0 and 59 yrs, (4) recent

death in the household of someone between the age of 0 and 59 yrs who experienced at least 3 months of chronic illness before death, and (5) the presence of children under 19 years with both parents deceased. Incidence of single-parent orphans and female-headedness were not considered to be a proxy, but nevertheless were also recorded and included as variables in the study analyses.

Incidence of HIV and AIDS proxies in households in the pilot survey

For the pooled pilot sample (n=575), 27.4 % of households had experienced recent mortality of someone 0–59 yrs in the past two years, and 22.2 % of these were preceded by continuous chronic illness. Double orphans were present in 20.8 % of households and chronic illness (0–59 yrs) in 41.9 % of households. Chronic illness (0–59 yrs) with free treatment was present in 28.31 % of households.

The frequency distribution of proxies tended to vary quite widely between sites (Figure 2.8). Nkandla, for example, had low mortality incidence (11.4 %) but very high chronic illness (70.5 %). Msunduzi, on the other hand, had high mortality (41.6 %) but relatively low chronic illness (21.8 %).

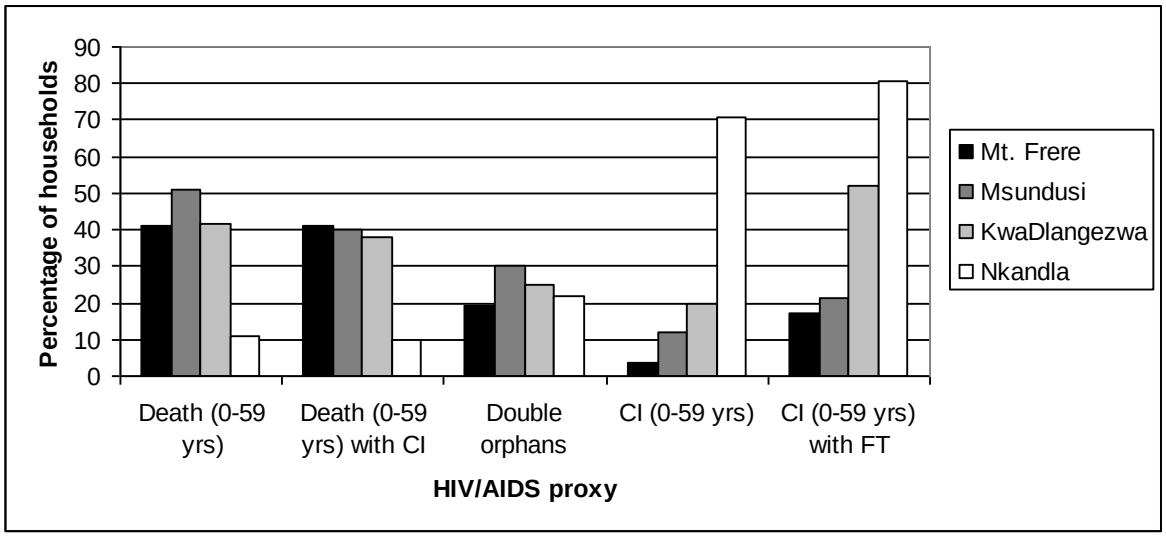


Figure 2.8. HIV and AIDS proxy incidence in households sampled during piloting (N=575).

CI= chronic (3 month continuous) illness. FT = free treatment.

Reliability of the HIV and AIDS proxies

In terms of identifying households with HIV and AIDS-related chronic illness, a number of researchers have raised concerns that the proxy-method is severely limited, due to its questionable ability to correctly identify people living with HIV or AIDS (Senefeld and Polsky 2005; Hunter *et al.* 2008). Initial analyses from some researchers have indicated that this proxy indicator over-exaggerates the cases of HIV infection. Barrère (2005) examined the use of this proxy indicator in a survey in Malawi and suggested that only 54 % of chronically ill sample were likely to have HIV or AIDS based on national infection rates. Yet while a similar scenario of overestimation is likely to be found in any study context, this phenomenon does not necessarily compromise the validity of the research, provided that the proportion of chronically ill people who are in the proxy-age demographic, but not suffering from HIV and AIDS (the so-called "false positives") have similar impacts on household food security as those who are infected by HIV. So long as this assumption holds, the study can be reasonably assumed to be measuring HIV and AIDS effects by proxy. This assertion is also in keeping with the nature of AIDS affliction. As the HIV virus manifests through such a wide variety of diseases, even if "AIDS affliction" could have been established with certainty within a household, there would still be a very large variability in the type of chronic illness recorded, the severity of symptoms and the degree of physical affliction. Similar considerations hold for interpreting mortality data.

Recently, new research by Twine and Hunter (2008) from Limpopo province has cast doubt on the assumption that HIV-death and non-HIV death of prime adults (15–49 yrs) are associated with similar food security outcomes. Twine and Hunter (2008) made use of longitudinal data from Health and Demographic Surveillance Systems, which provides detail of the cause of death by means of verbal autopsy records. Confusingly, Twine and Hunter (2008) found that households with non-HIV and AIDS prime adult deaths generally had higher odds of experiencing a food insecurity response compared to households with HIV and AIDS -attributed prime adult death. For dietary diversity, however, the trends were reversed. Twine and Hunter (2008) suggested HIV and AIDS infection *per se* was not as important as the overall socio-economic status of the affected persons and their relationship to the household. Far more useful, therefore, is to locate chronic illness, mortality, or dependant-fostering within the socio-economic and demographic context of the household. In this study, these nuances are captured wherever possible through disaggregating HIV and AIDS proxies

by a range of demographic categories, as well as gender status of the afflicted. HIV and AIDS effects are also considered within the overall context of the asset-status of the household.

Final selection of HIV and AIDS proxies

There are no definitive guidelines for establishing the age group for the proxy of "AIDS affliction". Age categories used to proxy HIV and AIDS-attributable deaths generally range from 18–59 yrs (SADC FANR VAC 2003) to 18–64 yrs (Dorrington *et al.* 2006). Twine and Hunter (2008) focused on mortality of prime age adults in the 15–49 yr category. In the pilot, there was a strong case for including the demographic of death of children in the HIV and AIDS proxy demographic. In the pilot, there were six cases of deaths of children between 0 and 17 recorded in the preceding two years and five of these were in households already classified as "afflicted". Alternate analyses were run on the pilot data using the 0–56 yr, 0–59 yr and 18–64 yr demographics as the HIV and AIDS grouping criterion. The 0–56 yr and 0–59 yr demographics usually yielded statically similar results. However, in some analyses which controlled for household income, better results were attained by using the 18–64 yr demographic. As a result of these considerations, in the second phase of research death and chronic illness in the 18–64 yr category was used as a selection criterion for HIV and AIDS proxy-affliction in the household. During data processing, however, alternate statistical

analyses were routinely run on the 0–56 yr and 0–59 yr[1], as well as the 18–64 yr demographic.

The imbalance in the proxy distribution between sites (Figure 2.9) suggested that in the second phase of research, households would need to be purposively selected according to proxy-status to ensure a balanced distribution of HIV and AIDS proxies between sites and within a site. This process is described in the section on sampling, below.

SAMPLING

Within each of the three study sites, households were purposively selected for participation in the study in the following way:

Step 1: Preparatory measures

[1] The 0-56 yr and 0-59 yr grouping criteria was almost identical to the 18-56 yr and 18-59 yr demographics. This is because the incidence of child mortality in the sites was very low (<8 incidents), so using the 0-59 yr demographic as opposed to the 18-59 yr demographic made little difference to what households were included in the categorisation. What's more, child mortality was frequently associated (7 of the 8 incidents) with the presence of other HIV and AIDS proxies in the household, such as PA adult mortality and chronic illness. For these reasons, the 0-59 yr demographic was selected over the 18-59 yr demographic in analysis.

Permission to conduct the study was acquired through consultations with the regional chiefs and village headmen, which usually included the presentation of the research plan to a community forum, where the community questions and concerns were addressed. Permission granted, local research assistants from the community (most of whom had been screened and trained in the piloting phase) were secured for the research period. Usually I worked with 2–3 research assistants at a time. The research commenced in KwaDlangezwa with a pilot of the new survey. As a result of this pilot, five assessments were effectively collected in KwaDlangezwa, but for the purposes of uniformity, the pilot was excluded in final analysis.

Step 2: Initial survey "sweep" of all households

Using aerial maps that were used to compile a stratified random sampling frame for the pilot, a sampling frame was marked off that included an estimated 200 households and research assistants were positioned throughout the sampling area. Every household within the sampling area was visited (barring a few refusals; n=3), and the household HIV and AIDS proxy and household demographic information, as laid out in the addendum, was collected. This usually took 20–30 minutes in each household.

Step 3: Categorisation according to HIV and AIDS proxies

Using the demographic and HIV and AIDS proxy information from the 200 households surveyed, households were classed according to their HIV and AIDS proxy status. The idea of categorising households according to individual HIV and AIDS proxies was considered, but this method was later dismissed as it would rule-out households with combinations of HIV and AIDS proxies and thus cumulative HIV and AIDS proxy effects. These cumulative effects may be interesting in themselves, as in some instances a specific HIV and AIDS-proxy may be found to be significant with an outcome of interest, only after adjusting for the presence (or absence) of concurrently occurring proxies. Households that were sampled in step 2 (above), were thus categorized according to their cumulative HIV and AIDS proxy-status, that is, as either; "non-afflicted" (no proxies), "borderline" (1–2 proxies) or "afflicted" (3–5 proxies).

Sample-size estimation calculations were performed using the standard deviations of estimated key variables in each site, as derived from the pilot. Presuming that the longitudinal, repeat-assessment method would significantly decrease the error of the survey

instruments, the minimum sample-size for each HIV and AIDS proxy category, in each site, needed to include at least 30 households. In each site, 30–35 candidate households in each affliction category (non-afflicted, borderline or afflicted) were selected from the 200 households surveyed in Step 2. Usually, most households fell into the "borderline" category; and of the 200 households, the "afflicted" and "non-afflicted" quotas were usually only barely reached, if at all. If the quota was not reached using 200 households, the survey area was extended and more households were sampled until the quota was reached. For the borderline households, for which an abundance of options usually existed, 30–35 candidate households were randomly selected from the borderline group.

Step 4: Final selection, permission to participate

Selected candidate households were revisited and their informed consent attained to participate in the study, in accordance with the Rhodes University ethical guidelines. If the household refused, another household in the same proxy category would be approached.

A total of 318 households were initially sampled in this way. By the end of Phase 2 this number had dropped to 295 (see the forthcoming section on attrition). The data from some of these "lost" households was still usable, however, as mean values could be used for missing assessments (see forthcoming section on data processing). This resulted in a final sample size of analysable data of 307. Table 2.3 gives a summary of the number of households in each site and category, selected at the start and the end of the second phase.

Table 2.3 The number of households in each site, and HIV and AIDS affliction category, selected at the start of sampling in October 2006 and the remaining number at the end of sampling in November 2007.

	KwaDlangezwa		Nkandla		Mt. Frere		All sites	
	Start	End	Start	End	Start	End	Total start	Total end
Non-afflicted	35	26	39	34	39	35	113	95
Borderline	27	30	33	33	30	31	90	94
Afflicted	37	29	39	42	39	35	115	106
Total HH	100	85	111	109	108	101	318	295

SURVEY INDICATORS OF HOUSEHOLD INCOME AND WEALTH

Two considerations were taken into account when selecting wealth measures. First, whether the wealth index in question is to be taken as a measure of *current* welfare or poverty status of the household, or as a proxy for something unobserved: a household's long-run economic status. For the latter, household asset indices weighted using principle component analyses are usually considered be more appropriate (Filmer and Pritchett 2001). For the former, current household income and/or household consumption expenditures are most commonly used. Both these measures are discussed in the section below.

Measures of current household wealth-status

There is a longstanding debate as to whether income or consumption expenditure is a better measure of current wealth, which has recently been rephrased within the context of HIV and AIDS. (Bechu 1998; Bachmann and Booysen 2004; D'Haese and Van Huylenbroeck 2005; Beegle *et al.* 2006; Mucina and Rutherford 2006; Collins and Leibbrandt 2007; Browne *et al.* 2007). Both household income and consumption expenditure were piloted in the first phase. There were a number of challenges associated with measuring household consumption expenditure: for example, there were problems with recall, or individuals within the extended family unit frequently acted as independent financial agents and the informant had no firm understanding as to their individual financial activities. For these reasons, the second phase focused on collecting detailed information on current household income and very limited data on household expenditure.

This was done in the following way: at every assessment, an estimate was taken of mean monthly household earnings, as derived from formal and informal sources. The average of these four values was then taken as the household's mean monthly income score after four assessments, which was normally and continually distributed. Loss or gains of income by resident household members were recorded at each assessment. Cumulative differences in income gained and lost over 12-months were calculated for each household; this measure was treated as a left-skewed continuous variable in analysis. Cumulative differences in income lost that could be attributed to death or illness over the last 36 months (24 months preceding the first assessment, plus 12-months over the four assessments) were also calculated for each household.

Due to the high degree of left-skew, as well as high variance in the income data, a dummy indicator representing loss or gain of income over the 12-month period was also derived. These were further disaggregated by age and gender. Dummies were also summed over the assessment period, thus recording, for example, number of females aged 18–64 who lost income over 12-months, and so on. A complete list of the income variables constructed and recorded in this way for each household is presented in the addendum.

Although household expenditure was not fully assessed, a very simple, basic expenditure measure was incorporated into the survey. Specifically, a record was kept of household expenditure "shocks" in the last three months. These were defined as all out-of-the-ordinary household expenses: school fees, funerals, weddings or rituals, unusual medical costs, building, asset or livestock purchases. This decision was heavily influenced by the literature at the time, which was dominated by discourse as to how households afflicted by HIV and AIDS would adjust to unexpected household "shocks", including expenditure shocks (Rugalema 2000; Gillespie *et al.* 2001; Baylies 2002; Barnett and Whiteside 2002; De Waal and Whiteside 2003; Jooma 2005). Although it was hoped at the time that this indicator might have value as an explanatory (or covariate-type) variable in analysis, in reality this variable offered very little in the quantitative analysis phase (although it had some use in the qualitative sense). With hindsight, the time dedicated to collecting this information would have been far better spent compiling for the household more conventional expenditure-linked poverty and food security indicators, such as percentage of income spent on food.

Household long-term wealth indicator

For indicators of the long-term relative wealth status of the household, a number of variables thought likely to be associated with household relative wealth status were initially piloted in the first phase. Montgomery *et al.* (2000) identified the absence of a "best practice" approach of selecting variables to proxy wealth status, as in many studies, variables are chosen on an "ad hoc" basis. Commonly, indicators of household physical characteristics, infrastructure (sanitation, water supply), livestock and fixed-asset ownership are included. The variables used in this study were largely selected using a common-sense approach that drew on my personal experience in the research sites. For example, infrastructural descriptors were largely excluded, as in both Nkandla and Mt. Frere all households used pit-latrines and drew water from communal taps in the village. In contrast, the type of material used for cooking (fuel wood, electricity, gas, etc) varied widely between households and was thus included as a variable in the wealth proxy-list.

For analysis, the proxy wealth measures (dwelling status, livestock ownership, fixed asset ownership) required aggregation in order to derive a uni-dimensional measure of a household's long-term wealth-status. One approach would be to simply sum the number of assets in the household, as done by Montgomery *et al.* (2000). This was the first line of analysis used, but the resulting index showed very weak correlations with measures usually associated with asset wealth, such as household income, food security status and / or social capital index of the household. Attempts to adjust the index using "intuitive" weightings based on my own field experience were also largely unsuccessful. More recently, studies have applied principle components analysis (PCA) to such data in order to derive an index of household long-term wealth status (Filmer and Pritchett 2001; McKenzie 2003), which is then used to group households into pre-determined categories (such as quintiles) to reflect wealth status.

PCA works best when asset variables are correlated, but also when the distribution of variables varies across cases, or as in this instance, households. It is the assets that are more unequally distributed between households that are given more weight in PCA (McKenzie 2003): variables with low standard deviations would carry low weight from the PCA; for example, an asset which all households own, or which no households own. Moreover, it was important to consider that the PCA data would span three distinct rural sites. Thus, an asset which all (or many) households own in one site, but which few (or no) households own in another site, may result in the assignment of weightings that are attributable to site characteristics (i.e. the ecology or socio-cultural characteristics of the site), rather than wealth attributes of the household *per se*. One way to overcome this problem would be to conduct separate PCAs for each site. However, this was not desirable due to the small sample-size of the available data. Moreover, separate PCAs for each sites may result in very different dimensions of "wealth" being captured for each site, which may compromise the validity of analyses which treat the resulting wealth-proxy aggregate as comparable (or relative) across sites.

As a first step, descriptive analyses were carried out for all variables, looking at means, frequencies and standard deviations (Table 2.4).

Table 2.4. Mean proportions of households from the second phase of research registering key wealth and livestock proxies.

	KwaDlangezwa		Nkandla		Mt. Frere	
Variable description	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev
Cooking method						
Firewood	0.9	0.3	0.96	0.2	0.86	0.35
Charcoal	0	0	0	0	0	0
Dung	0	0	0.02	0.14	0.02	0.14
Paraffin	0.52	0.5	0.63	0.49	0.6	0.49
Gas	0.17	0.38	0.05	0.22	0.1	0.3
Electricity	0.25	0.44	0.06	0.24	0	0
Livestock						
Chickens	0.48	0.5	0.58	0.49	0.55	0.5
Cattle	0.04	0.19	0.43	0.5	0.27	0.45
Goats	0	0	0.22	0.41	0.3	0.46
Pigs	0	0	0	0	0.19	0.39
Sheep	0	0	0.01	0.1	0.14	0.35
Fixed assets						
Radio	0.75	0.44	0.71	0.46	0.59	0.49
Oven	0.07	0.25	0	0	0.05	0.21
Hotplate	0.23	0.43	0.06	0.24	0	0
Fridge	0.38	0.49	0.16	0.37	0.13	0.34
Cel Phone	0.69	0.47	0.68	0.47	0.5	0.5
Television	0.36	0.48	0.14	0.35	0.21	0.41
Bicycle	0.04	0.19	0.03	0.17	0.03	0.17
Car	0.06	0.24	0.05	0.22	0.09	0.29
Table	0.7	0.46	0.46	0.5	0.77	0.42
Chairs	0.62	0.49	0.45	0.5	0.18	0.38
Sofa	0.46	0.5	0.18	0.38	0.3	0.46
Dwelling						
Plastered walls	0.63	0.48	0.24	0.43	0.58	0.5
Cement floors	0.63	0.48	0.24	0.43	0.58	0.5
Ceilings	0.11	0.31	0.04	0.2	0.1	0.3
Agricultural tools						
Plough	0.08	0.27	0.23	0.42	0.25	0.44
Fork	0.06	0.24	0.13	0.34	0.69	0.63
Hoe	0.84	0.37	0.68	0.47	0.4	0.49
Spade	0.62	0.49	0.61	0.49	0.83	0.38

As Table 2.4 indicates, firewood was an example of a variable that was widely utilized by all household in all sites, which limits the usefulness of this variable in a PCA. An example of a "clumped" variable was electricity, which was used for cooking in 26 % of households in KwaDlangezwa, 6 % of households in Nkandla, but 0 % of households in Mt. Frere. To

include electricity as a proxy in the wealth component PCA would thus imply that all Mt. Frere households are more likely to be weighted "poor" relative to Nkandla and Mt. Frere households. It is also notable that many categories of livestock ownership showed severe clumping between sites. Only chicken-ownership showed an equitable frequency distribution across sites.

Because variables with clumped distributions have little ability to provide information about what characteristics separate households form each other, variables with clumped distributions and/or uniformly high incidence are commonly excluded from PCA analyses(McKenzie 2003; Vyas and Kumaranayake 2006). The initial PCA analysis was thus run excluding clumped variables run using the co-variance matrix of the data (Table 2.5). It is generally assumed that the first principle component can be taken as a measure of economic status (Houweling *et al.* 2003; Vyas and Kumaranayake 2006), although it is useful to check the validity of this claim by examining the content of the second component.

Table 2.5. Principle components analysis for an initial PCA using all variables listed and a revised PCA excluding variables marked n/i = not included.

	Initial PCA		Revised PCA	
	Factor loadings		Factor loadings	
Variable description	PC 1	PC 2	PC 1	PC2
Paraffin	0.093	-0.479	0.116	-0.802
Gas	0.123	0.001	n/i	n/i
Chickens	0.118	0.536	n/i	n/i
Radio	0.092	0.375	n/i	n/i
Cell Phone	0.196	-0.073	0.245	-0.393
Television	0.293	0.034	0.344	0.066
Bicycle	-0.027	0.024	n/i	n/i
Car	0.096	0.025	0.108	0.033
House with plastered walls	0.366	-0.313	0.443	-0.005
Cement floors	0.371	-0.140	0.421	-0.193
Table	0.387	-0.018	collapsed	collapsed
Chairs	0.386	0.029	0.373	0.125
Fridge	0.276	0.601	0.326	0.198
Sofa	0.340	0.023	0.395	0.311
Ceilings	0.128	0.012	n/i	n/i
Hoe	0.146	0.434	n/i	n/i
Spade	0.143	0.149	n/i	n/i
Eigenvalues	0.774	0.315	0.637	0.276
Proportion of the variance	0.243	0.098	0.331	0.140
Cumulative proportion	0.243	0.341	0.331	0.474

The initial analysis has a first principle component which described 24.3 % of the variance. This percentage is not high, but acceptable when compared with percentage of variation explained by the first component in comparable studies. Houweling *et al.* (2003) found the first principle component accounted for 12 %, whereas McKenzie (2003) found 27 %. In PCAs conducted on DHS data from rural and urban sites in Ethiopia and Brazil, results from the first principle component only explained between 11 % and 16 % of the variation in the original data (Vyas and Kumaranayake 2006). Factor loadings for the first component show that dwelling characteristics and possession of "living room furniture" are strongly loaded. Surprisingly, possession of a car has a low factor loading and ownership of a bicycle was negatively associated with wealth. Interestingly, bicycle-ownership has also been attributed with negative factor loadings in a number of other contexts (Gwatkin *et al.* 2000; McKenzie 2003; Houweling *et al.* 2003). A second wave of analysis excluded those variables that had low factor loadings, and collapsed "table" and "chairs" into a single category (the two were highly correlated). The result was a first principle component comprising just nine variables that explained a much higher percentage of the overall data variance (33.1 %).

Using the factor scores from the first principle component in the adjusted analysis (Table 2.5) as weights, a dependent variable was constructed for each household with a distribution as indicated in Figure 2.9. Although not normally distributed, the distribution of the data does show an even enough spread to make differentiation between socio-economic groups possible through the allocation of households into wealth quintiles at the pooled data-level possible. It should be noted, however, that at the site-level the degree of wealth-proxy differentiation was very low in Nkandla, due to the homogeneity in wealth and dwelling characteristics noted in the Nkandla site descriptions.

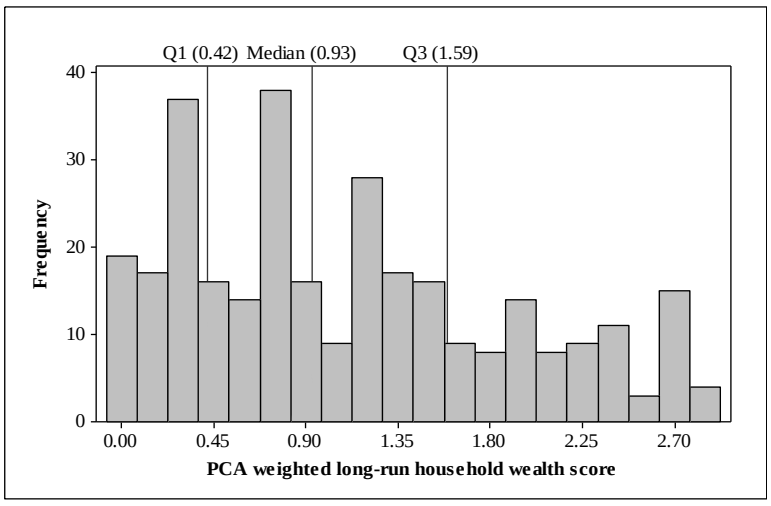


Figure 2.9. Distribution of long-run household wealth scores as calculated using PCA-derived weightings. Wealth quintiles (Q) are shown.

SURVEY INDICATORS OF HOUSEHOLD FOOD SECURITY

Two indicators of household food security were piloted in Phase 1, namely a Household Dietary Diversity Score (HDDS) which was derived from a detailed 48 hr household's dietary recall and a subjective, user-rated measure of the household's experience of hunger and food security. Following the pilot, both of these indicators were refined, and then re-implemented as repeat measures at each of the four (3-monthly) assessments in the second phase. Repeat food security assessments taken from the same household at different times were used in order to minimize inter-household variability (due to the pooled standard-deviation) and reduce sampling error or intra-household variability. Repeat assessments would also adjust for seasonal effects and other time-trends such as "pay-day" diets. At each repeat assessment, the reference period for each food security indicator was as follows: for the HDDS, a detailed household hour dietary recall of all foods consumed in the past 48 hrs. For the Coping Strategy Index (CSI), the household's experience of the items in the index over the three months preceding the first assessment; or for repeat (#2, #3 and #4) assessments, "since our last visit". Usually, respondents did not know when the next survey visit were to take place, as it was not always possible to predict the exact date upon which a visit were to occur. Specific methods pertaining to each indicator are detailed in the sections which follow.

Household Dietary Diversity Scores (HDDS)

Household Dietary Diversity Scores (HDDS) were used as a food utilisation indicator. HDDS are a simple count of the food groups or food items used by a household over a given reference period. A full review of dietary diversity indicators, and the HDDS, is provided in Chapter 3.

In order to derive HDDS, a detailed 48 hr dietary recall was adapted from the methodology suggested by (Swindale and Blinisky 2005). The recall asked informants to enumerate how many of eleven food groups (cereals; roots and tubers; vegetables; fruits; pulses, nuts and legumes; meat; fish and shellfish; dairy; fats and oils; sugars) were consumed by the household in the last 48 hrs. Cereals here were defined as "any member of the grass family (Graminae) which produces edible, starchy grains usable as food by humans and livestock (Kruger *et al.* 2005). Snack items between meals that were consumed by individuals within

the household premises were also recorded, but only if they were consumed within the household.

The 48 hr recall method was fast to administer and readily accepted by subjects. However, probing informants on all foods consumed *by the household* within the given reference period sometimes posed difficulty. The person responsible for preparing the household meal could not realistically be expected to know what all members in the household had eaten at all times, even if the line of questioning did restrict the enquiry to foods consumed within the household. The literature is surprisingly silent on advising how this issue is to be tackled (Hoddinott 2002; Food and Nutrition Technical Assistance (FANTA) 2002; Hoddinott and Yohannes 2002). In order to ensure uniformity, the informant was asked to enumerate the following details, in the following order:

1. What had they personally eaten in the last 48 hrs?

2. Were the foods they consumed eaten as a household meal?

3. If not, what items were consumed as a household meal?

4. To their knowledge, did any other household members eat different foods in the last 48 hrs within the homestead?

Usually, if household members were dwelling within the same homestead, they ate a relatively monotonous diet and there was little variation in the diets between household members. Thus, the foods consumed by the person responsible for preparing the household meal (whom we interviewed) were almost always the same as the foods consumed by the household. Those food items that did tend to vary between individuals were often in the same food groups (such as choice of cereal-type eaten with the meal), which has no effect on the overall household dietary diversity score. This method, however, did tend to underestimate HDDS through the occasional omission of snack items and foods usually eaten by specific groups, such as wild fruits by young children, bushmeat by men and specific luxury items that would not necessarily be shared by family members.

Coping Strategy Index (CSI)

A 16-item Coping Strategy Index (CSI) with four response categories was used as an experiential (or user-rated) measure of household food security. A full description of the theoretical and historical discourse attached to the CSI is provided in Chapter 3. In brief, the CSI was adapted from the method developed and piloted by Maxwell *et al.* (1996 1999, 2003)

by the WFP and CARE international for use in detecting short-term food insecurity in developing countries. The 16 items used in this study are listed in Table 2.6.

The items in Table 2.6 are divided into two sub-sections. The first sub-section includes 9 items that measure the household's Experience Resource Restriction (ERR). The ERR covers uncertainty or worry about food: food of inadequate quality, quantity (which may occur with or without hunger) and the consumption of socially unacceptable food. These four domains of food insecurity were initially identified by Radimer, Olsen and Campbell (1990) and form the basis of the US national Household Food Security Survey Measure (HFSSM). Items covering these four domains have been tested quite extensively by Maxwell *et al.* (1996 1999, 2003) in approximately twelve developing countries. More recently, they have been used to form the basis of a Household Food Insecurity Access Scale (HFIAS), which has shown promise of relevance across a range of developing country contexts and cultures (Coates 2004; Coates *et al.* 2006b), following testing in Burkina Faso (Frongillo and Nanama 2006) and Bangladesh (Frongillo *et al.* 2003). The final eight items on the CSI relate to the employment of household coping strategies or the household's Experience of Resource Augmentation (ERA). The ERA items used in this study are the same as the ones proposed by Maxwell *et al.* (2003), except that item 14 pertaining to use of wild animal protein was added, and an item relating to sending household members to eat meals elsewhere was dropped due to its low frequency of positive response in the pilot.

Table 2.6. The Coping Strategy Index (CSI) showing sub-components of Experience of Resource Restriction (ERR) and Experience Resource Augmentation (ERA).

	No	1 time a week	2 or 3 times a week	4 + times a week
Experience of Resource Restriction (ERR)				
1. Did you, or anyone in your household, worry about not having enough food?	0	1	2	3
2. Were you, or anyone in your household, not able to eat foods you preferred?	0	1	2	3
3. Were you, or anyone in your household, forced to eat a limited variety of foods?	0	1	2	3
4. Were you, or anyone in your household, forced to eat food you found demeaning or embarrassing?	0	1	2	3
5. Did you, or anyone in your household, eat a smaller meal than they felt they needed?	0	1	2	3
6. Did you, or anyone in your household, eat fewer meals in the day than you would have liked to because of no food?	0	1	2	3
7. Was there ever no food at all in the house?	0	1	2	3

8. Did you, or anyone in your household, go to sleep hungry	0	1	2	3
9. Did you, or anyone in your household, go a whole day without eating anything due to lack of food?	0	1	2	3
Experience Resource Augmentation (ERA)				
10. Did you, or anyone in your household, borrow food or go to relatives or friends?	0	1	2	3
11. Did you, or anyone in your household, sell any of your animals to buy food	0	1	2	3
12. Did you, or anyone in your household, buy foods on credit from a shop?	0	1	2	3
13. Did you, or anyone in your household, collect and eat wild leafy vegetables?	0	1	2	3
14. Did you, or anyone in your household, collect and eat wild animals?	0	1	2	3
15. Did you, or anyone in your household, harvest immature crops?	0	1	2	3
16. Did you, or anyone in your household, work for food?	0	1	2	3

At each assessment, respondents were asked to rate the household's experience of the CSI items (Table 2.6) over the preceding three months. A response value of 0–3 was used to record the intensity and severity of the experience. For the purpose of analysis, the household's responses at each assessment were summed to derive totals for each CSI item, as well as the overall ERR, ERA and CSI scores. The original CSI proposed by Maxwell *et al.* (2003) makes use of community focus groups to rank (and then weight accordingly) the severity of coping strategies in each site. This weighting system was piloted in the first phase, but not incorporated into the final study methodology. Alternate analyses run on weighted and unweighted experiential scores showed the weighting system rather tended to increase the inter-site variability, making pooled and comparative analysis difficult. More importantly, however, recent indications from the FANTA research in Burkina Faso and Bangladesh have also suggested that the weighting system proposed by Maxwell *et al.* (2003) be dropped (Coates 2004; Kennedy 2005), and the FANTA research in these countries now applies the unweighted CSI (Frongillo *et al.* 2003; Frongillo and Nanama 2006). There is also no mention of the items from the CSI used in the South African FIVIMS pilot being weighted (Verduijn 2004). For these reasons, if the CSI used in this study was to be current with the trends of parallel research in this field, it was necessary to compile the aggregate CSI in its unweighted form.

INDICATORS TO CAPTURE DIVERSE FOOD ACQUISITION STRATEGIES

Overall, I felt that the quantitative pilot failed to capture the contribution of diverse livelihood capitals to household food security. This was because the links (if indeed they were present) between HIV and AIDS and food acquisition strategies were often not obvious to informants. Whereas the researcher tends to think of a household's responses in terms of "coping *strategies*", in reality most households showed little evidence of strategy, forethought and planning in their responses. Granted, that in qualitative interviews and focus groups we did usually manage to make these issues explicit with informants, but the question remained as to how these complex issues could be probed through quantitative means. The second phase of quantitative research thus saw a number of modifications to the household survey format that were designed to capture (in a quantitative format) the contribution of diverse livelihood capitals to household food security. This was done through two means:

First, the 48 hr dietary-recall instrument was disaggregated to reflect the source of the food-group reported as recently consumed. Sources of food would be one of a possible four, each of which is taken to represent the degree to which a household is drawing on a specific livelihood capital in order to secure food. Namely, whether the food was secured through: purchase (financial capital access), donation (social capital access), collection (wild edible natural capital access), or subsistence cultivation or slaughtering of domestic animals (household physical and natural capital access).

Second, detailed addendum-type modules, each attached to one of the repeat assessments, were devised in order to explore household reliance on specific livelihood capitals for food acquisition. Addendums were devised through the experience derived from the pilot and through consulting the relevant literature. Full details on each livelihood capital addendum, and detailed reviews of the literature pertaining to them, are provided in the respective results chapters.

QUALITATIVE METHODS

The qualitative methodologies that accompanied the quantitative household surveys were largely structured around the quantitative methodologies and were implemented as follows. At each quantitative assessment, efforts were made to engage with informants and gather as

much supplementary data as possible regarding the household, its inhabitants, their daily life and struggles. Although no concerted effort was made to formally interview household members, when issues of interest or relevance arose during informal discussion, the subject was pursued in more detail using an informal and unstructured interview format and a translator. The longitudinal nature of the quantitative survey largely facilitated these kinds of engagements. At each repeat assessment, it was quite easy to follow-up with an informant on an issue of relevance and interest from the preceding visit. Thus, we would enquire as to the health of previously sick members, ask why a household member had left or arrived at the household, what impacts such movements have had on the household, how the crops planted at the last assessment had matured, and so on.

As might be expected, it was not possible to gather this kind of data in all households visited and to the same extent in all sites. In some households, a particularly rich and informative relationship was established, whereas other households remained aloof and distant throughout the study period. Similarly, not all sites responded to our presence in the same way. In Mt. Frere and Nkandla, informants were generally polite, but distant. More open engagements were really only possible with a few households. However, in KwaDlangezwa we managed to establish a richer relationship with the research community. This was attributable to a number of factors. Firstly, for the 18 months from February 2006 through August 2007, I was residing within 5 km of the KwaDlangezwa community. My permanent presence there meant that it was possible to build a more solid relationship with the KwaDlangezwa research community. Over the 18 months I was resident near KwaDlangezwa, I became somewhat involved in local community affairs and assisted community members in registering a local NGO, upon which I sat as a committee member for 12 months. Secondly, my residential status in this area allowed for a close working relationship to develop between myself and my KwaDlangezwa research assistant, Lindiwe Nsibande. Over the two year period I worked with Lindiwe, I was able to provide her with continuous training, until she had a very good sense of the research themes I was pursuing. Her ability to conduct quantitative interviews while at the same time extracting (and faithfully reporting) qualitative supplementary details was invaluable. As a result of these factors, the qualitative supporting data for KwaDlangezwa is particularly rich.

DATA PROCESSING, MANAGEMENT AND ANALYSIS

Qualitative case history data

As with most research that seeks to combine qualitative and quantitative methods in a manner that is mutually supportive, it is often difficult to adequately balance the two, or to determine

which methodology should be primary. In an effort to balance the overall approach, in the pilot, qualitative investigations (such as focus groups and interviews) were used as the primary method of investigation and quantitative methods were grounded in these exploratory qualitative investigations. In the second phase, however, the quantitative structure of the repeat surveys guided the qualitative data-collection process, both methodologically in terms of the structure and timing of qualitative assessments and also analytically (see below).

In the second phase, qualitative data were analysed in the following way. Initially, all the field notes and interview transcriptions taken at each assessment were entered into a "qualitative" field created as a supplement to the quantitative data fields for each quantitative assessment. During data analysis, case histories and interviews were reviewed, and all references to themes relevant to the research objectives in this thesis were coded and marked in the spreadsheet. Households were then analysed quantitatively, using the analyses recorded in the methods section on quantitative data analysis. During qualitative analysis, households that demonstrated trends of interest (for example, households that either typified a trait, or represented significant outliers to the trait), were flagged, and the qualitative supporting data for that household was consulted in order to contextualize and help explain the quantitative data trends. Households that had been flagged with qualitative codes pertaining to a specific research area were also referred to during analysis. Throughout this thesis, these data is drawn upon, where relevant, to contextualize and inform the quantitative data. The primary use of quantitative household surveys to guide data analysis is in keeping with the conventions of food security and rural livelihood research in other, comparable studies (for example, FAO 2003d; Yamano and Jayne 2004; Mather *et al.* 2005; Jayne *et al.* 2006). In the South African context, these types of quantitative studies are believed to be especially important, as much of the current understanding of HIV and AIDS impacts in South Africa comes from qualitative techniques that rely on "people who know" - as opposed to more hard, quantitative evidence that addresses temporal change (Aliber and Drimie 2004).

Quantitative survey data

Attrition

In total, 23 of the households monitored in the study experienced attrition. Some of these households were dissolved (n=8), or became amalgamated with other households over the 12-month assessment period (n=4). In KwaDlangezwa, a number of households (n=11) had to be dropped from the study due to an unfortunate incident involving the theft of some research

equipment. The thief in question was soon identified by the community, as he was a regular offender and had been seen with the goods in question. The village headman interceded and retrieved the stolen goods on my behalf, but unfortunately this area became unsafe for us to continue our research activities in, as the alleged thief in question was still resident there. A strategic decision was taken to abandon those households following the second assessment.

Households with attrition were treated in the following manner: If dissolution, refusal or attrition occurred after the third assessment was completed (n=9), the average (rounded down) score for the preceding three assessments was taken as a fourth assessment estimate. If dissolution, refusal or attrition occurred before the third assessment was completed (n=7), the household was excluded from analysis. As the number of households totally excluded from analysis (n=7) was not large enough to compromise the overall statistical significance of the final data-set, the impacts of attrition on the overall sample were not deemed too severe.

Missed assessments

On occasion, it was necessary to miss an assessment. This would occur when repeat visits failed to find a suitable respondent, or it was discovered that the resident(s) were temporarily absent from their home (visiting relatives, looking for work, working in on-site contractual work, at a funeral, etc). The numbers of missed assessments after 12 months were KwaDlangezwa (6), Nkandla (8) and Mt. Frere (11). Efforts were made to minimise the negative impacts of missed assessments on data quality, through excluding from analysis households which had missed more than one assessment. Thus, households characterized by missed assessments were treated in the following manner: where only one of four assessments was missed, the mean value (rounded down) for the remaining three assessments was taken, if two or more assessments were missed, the household was excluded from analysis.

Proxy status-changes

Many of the so-called non-afflicted households were re-assigned to borderline, or even afflicted status as the year progressed. This was necessary as household members became ill, fostered new individuals, or experienced mortality (15 incidents in 12 months). Household proxy-status was also sometimes corrected, as sampling errors were detected with repeat visits, or it became apparent that the household had purposely concealed information. In a way, this “correction” of the household status over time is one of the benefits of the longitudinal assessment method, where repeat measures can be used for the purposes of

validation, decreasing sampling error. However, the corrections experienced were more than had been anticipated in the design phase and at the final assessment there were far fewer non-afflicted households than originally anticipated. This outcome is an important lesson for future research that seeks to address the longitudinal effects of HIV and AIDS on a household over time. For the current study, the implications of the diminished number of non-afflicted households over time were a potential decrease in the statistical power of the control group. Although this effect was not pronounced enough to render the sample-size of the control group invalid for any of the analyses of interest, it should be noted that some of the thresholds for statistical significance reported on in this study may have been more readily crossed should the sample-size of the control group have been larger.

Table 2.7. Numbers of households in each HIV and AIDS affliction category, categorized by site, at the start (assessment 1, month 1) and end (assessment 4, month 12) of the study period.

	KwaDlangezwa						Nkandla						Mt. Frere						All sites	
	Start					End	Start					End	Start					End	Total start	Total end
		Refusal	proxy change (gained)	proxy change (lost)	Dissolution/amalgamation			Refusal	proxy change (gained)	proxy change (lost)	Dissolution/amalgamation			Refusal	proxy-change (gained)	proxy-change (lost)	Dissolution/amalgamation			
Non-afflicted	35	4	0	4	1	26	39	0	0	2	1	34	39	0	0	1	3	35	113	95
Borderline	27	3	8	0	2	30	33	0	2	7	0	33	30	0	3	0	2	31	90	94
Afflicted	37	4	0	4	1	29	39	1	7	0	0	42	39	0	0	2	2	35	115	106
Total HH	99	11	8	8	4	85	111	1	9	9	1	109	108	0	3	3	7	101	318	295

Data-processing of HIV and AIDS-proxies

Given the tendency of the HIV and AIDS proxy-status of a household to change over the course of the survey assessment period, a method was required for capturing the extent to which a household's HIV and AIDS proxy-status was defined over time. In this study, this was done through summing the HIV and AIDS proxy-score of a household over time and weighting the proxy by its prevalence in the household. This was accomplished in the following way:

A dummy-variable was constructed to record presence or absence of an HIV and AIDS-proxy in the household at each assessment. This dummy variable was summed over the four assessments, to give an indication of the proxy's weighting in the household after 12-months (or four assessments). Thus, for households with chronic illness of a single adult aged 18–64 at all four assessments, the cumulative proxy score for this household was 4. For households with chronic illness of two adults aged 18–64 at all four assessments, the cumulative proxy score for this household was 8. For households with chronic illness of two adults aged 18–64 at three assessments, the cumulative proxy score for this household would be 6, and so on. Likewise, a household with four paternal orphans over four assessments would have a cumulative paternal orphan proxy score of 16. For recent mortality, each mortality event in the relevant demographic for the preceding two years scored a constant of 1 over each assessment. Thus, a household with two prime adult deaths in the two years preceding the first assessment would have a score of 8 by the end of the assessments. However, if there was an additional mortality incurred over the 12-month assessment period, this cumulative mortality would be added to the household mortality score. Presence of mortality during the assessment period was also recorded as a separate binary dummy variable, but this variable was difficult to include in statistical analyses due to small sample-size (n=15 additional deaths over the assessment period, roughly 5 % of households being monitored). It was however, considered in qualitative analysis.

The summed dummy variables had an awkward distribution. The range was generally large (from a minimum score of 0, up to as high as 20–26 if, say, 5–6 people in the household were regularly afflicted with the proxy). Proxies were also heavily left-skewed, as most households registered a 0 for every proxy. As a result, summed dummies usually followed a Poisson distribution with the mean in the region of 0.5 and it was not possible to approximate a normal distribution for the summed dummy data. Moreover, many of the summed proxy categories had less than five observations in each category, which further restricts normal approximation (Milton 1992) . These factors had implications for limiting the range of statistical analyses that could be performed on the data. However, two methods were employed to manage these irregularities. First, the summed dummy variable was collapsed into a simple presence/absence dummy of a given HIV and AIDS proxy over the 12-month assessment period. This binary variable could then be used as a dichotomous grouping variable in

analyses. Second, during data-cleaning, categories with less than five observations were collapsed into lower-order categories, in order to even-out the distribution of data within categories. Logistic regressions were then used, which incorporated the HIV and AIDS proxy-variables into regression models as categorical explanatory variables. These two forms of HIV and AIDS proxy indicators: binary presence/absence dummies and summed proxy category are the dominant analysis variables for HIV and AIDS effects in this thesis, as evidenced in the results chapters which follow.

Household migration

For each household, a single numerical score was derived in order to indicate the degree of migration the household had experienced over the 12-month assessment period. At each 3-monthly assessment, movement of individuals in and out of the household was recorded. Migration from the household was identified by systematically working through the list of members recorded at the first assessment, and enquiring as to their current place of residence. Household members who were initially recorded as present in the household, but who were now described as "sleeping elsewhere" were marked as absent from the household. Conversely, household members who were recently assimilated into the household were added to the list of original household members.

The collection of data in this way allowed for the construction of a dummy variable that mimicked a skewed, continuous distribution. This variable suggested the degree of migrant activity in and out of the household over an annual period, for different demographic groups. For example, an indicator variable would be constructed to indicate arrival of a male aged between 18 and 64 years into the household over 12-months. If no such activity occurred in the household over 12 months, the household would score 0, if one male in this demographic arrived in the household at a single assessment, the household would score 1, if two males arrived at a single assessment the score would be 2, if one male arrived at two separate assessments the score would also be 2, and if two males arrived at two separate assessments the score would be 4, and so on. Although it would have been useful to exploit the richness of these data through treating the resulting migration scores in each demographic category as continuous variables, the data was too heavily skewed to the left (most household showed zero incidence of a migratory event in each demographic category) to make such finely nuanced analysis possible. Thus, after four assessments, these dummy variables were summed and collapsed into a single binary variable marking presence or absence of a migratory event over the assessment period.

Household health status

Similar to the household migration indicators derived above, numerical scores were calculated for each household in order to indicate the cumulative health status of key household demographics over the 12-month assessment period. At every assessment, the health status of each household member was assessed by asking the informant to rank their health as either better, worse, or the same as it was at the time of the preceding assessment. Or, for the first assessment, their status was compared to three months before the first survey was taken. A dummy variable would be constructed to indicate if demographic groups of interest (such as wage earners or household heads) were better, the same or worse relative to three months previous. A cumulative score of 4 for the "better" dummy would indicate that the person continued to improve in health over 12 months and four assessments, a score of 3 would indicate that for three out of four assessments the household-head had improved health and so on, to a minimum default score of 0, which indicated no activity in that category.

CONCLUSION

At the conclusion of the data collection and processing, more than 12-months of qualitative and quantitative data were available for analysis. Data included two alternate indicators of household food acquisition (the HDDS and CSI), which, when examined additively over the assessment period, presented a score for household food acquisition over time that naturally adjusts for variability associated with seasonal and sampling error. In data analysis, these food security variables were both continuous and normally distributed, and would be used as outcomes or response variables in data analysis.

In terms of independent variables, considerable effort was put into capturing quantitatively the influence of diverse livelihood capitals in food acquisition, so that these drivers could be incorporated into quantitative analysis. For an indicator of financial capital access, this was done by continuously collecting and verifying the chosen measures of current and long-run household wealth over the 12-month period. For indicators of social capital access, the level of social capital in the household was measured using a social capital addendum (detailed in Chapter 6) and evidence for social capital-draws in food acquisition strategies were quantified using a record of donated foods in the household's 48 hr recall over time. For indicators of wild natural capital access, the degree of household reliance on wild natural capital for food acquisition was measured using a seasonal wild

food addendum (detailed in Chapter 5) and the number of wild foods in the household diet was also quantified over time. Finally, recognising that household land-use was greatly tied to physical and human capital (or labour) availability, a household labour addendum was collected (detailed in Chapter 4) and a record was kept of the use of cultivated natural capital in the diet over 12-months.

Combined with the rich qualitative data gathered in the research sites over time, these data provides a basis for exploring the relationship between diverse livelihood capitals and food acquisition in the research sites. Although this subject is both an interesting and important research topic in itself, this study is primarily concerned with the relationship between the above factors and presence of HIV and AIDS in the household. Thus, the chapters which follow specifically, and thematically, examine the relationship between the incidence of HIV and AIDS proxies in the household and influencers of household food acquisition.

Chapter 3. The Relationship between Household HIV and AIDS Status and Household Food Security

INTRODUCTION

This chapter describes the relationship between household HIV and AIDS status, household socio-economic status and household food security-status. These relationships need to be explored at the outset of this thesis, in order to lay the basis for the chapters which follow. Whereas the current chapter asks if there is a relationship between HIV and AIDS proxies and the aggregate food security indicators, the results chapters that follow will ask: how can we account for the relationships observed (in this chapter), through disaggregating the food security indicators into their key components, in order to reflect the employment of diverse livelihood capitals in food access?

Through exploring broad trends in the relationships between household HIV and AIDS status and household food security, this chapter also introduces two important themes that will be returned to again in the final chapter, namely (1) the sensitivity of the aggregate food security indicators (the HDDS and CSI) to a so-called "HIV and AIDS effect" and (2) the nature of the "effect" (that is, the type of food insecurity) that is being detected. In order to introduce these themes, this chapter commences with a review of the two food security indicators used in this study, in order to familiarize the reader with some of the strengths, but also potential limitations, of the survey instruments.

Measuring household-level food security

How best might we measure household food security in developing country contexts generally and specifically in the context of HIV and AIDS? Conventionally, assessments of food access and utilisation have been divided into measurements of sufficient food quality and quantity (Ruel 2003). Food quality adequacy is most reliably measured through direct means or quantitative measurement, such as human serum analysis for micronutrient adequacy and anthropometric measures. In like manner, adequacy of food quantity is usually monitored through energy adequacy assessments, where actual quantities of available and consumed foods are recorded and weighed in relation to the caloric requirement ratios for the subject.

But monitoring dietary quality and quantity using the complicated food quantification methods cited above is often not feasible – due to time, human resource and methodological constraints. These methods are also considerably invasive and are generally not deemed suitable for long-term food security monitoring systems which assess a large number of people over long periods of time. Measures such as child anthropometry are somewhat more acceptable in this respect, but have limited applicability to this study, which sought to address the current impact of recent, short-term household shocks on household food security. Child anthropometry is also heavily influenced by maternal diet when the child was *in utero* (Frongillo 1999), which makes this method inappropriate for measures of recent or current shock events such as mortality and morbidity.

In response to these methodological constraints, in the early 1990s, empirical analyses by Haddad *et al*. (1992; 1994) at the International Food Policy Research Institute (IFPRI) suggested that a number of relatively simple indicators could perform well in locating the food insecure. These proxy-indicators included the number of unique food groups consumed within a given period (dietary diversity) and a variety of socio-economic indices scaled to household demographics: such as dependency ratio of children to adults and household size. Consequent empirical work by Chung *et al.* (1997a; 1997b) in India found that the frequency with which a household reported consuming specific food groups performed particularly well against a benchmark of chronic food quantity insecurity (Chung *et al.* 1997b).

The last decade has seen a proliferation of subsequent studies that have supported the use of overall dietary diversity as a proxy for a range of household food access benchmarks (Ruel 2003), including some of the so-called "gold standard" benchmarks for food quantity adequacy, such as household energy availability and household socio-economic status (Ferguson *et al.* 1993; Hatloy *et al.* 2000; Hoddinott and Yohannes 2002). What's more, other studies conducted at the individual level have found that dietary diversity performs well against benchmarks of overall dietary quality (Savy *et al.* 2005), including quantitative measures of nutrient adequacy (Ogle *et al.* 2001; Torheim *et al.* 2003; 2004; Azadbakht *et al.* 2005). As such, this study included a measure of dietary diversity, the Household Dietary Diversity Score (HDDS), as one of the key indicators of household food security (Chapter 2).

In tandem to the above debates, for over a decade there has been a growing awareness that food access and utilization indicators (and proxies thereof) may not adequately cover the full spectrum of household food security (Maxwell 1996; Coates 2004; Kennedy 2005). Food adequacy, it is argued, is in itself a proxy for a more abstract sense of wellbeing and the experience of "being food secure". This experiential aspect of food "security" has at its core an understanding of vulnerability and response in household strategies for managing risk (Maxwell *et al.* 1999).This concept of vulnerability is often gauged through qualitative or "self-assessment" indicators of food insecurity,

which capture dimensions which are difficult to isolate with traditional quantitative measures, especially in the absence of panel data. In recent years, there has been a call to shift the approach in food security assessment from a reliance on objective measures towards a greater appreciation of the subjective experience of hunger (Webb *et al.* 2006). This has resulted in indicators designed to assess the local level experience of, and response to, restriction of food access (Maxwell *et al.* 2003).

Experiential measures have proven apt in a number of developing country contexts. One experiential index, the so-called Coping Strategy Index (CSI), which was initially piloted by Maxwell in Mali (Maxwell 1996), has been widely applied as an early warning tool in a number of African countries by the World Food Program (Maxwell *et al.* 2003) and a number of developing countries have successfully implemented similar methodologies (Nord *et al.* 2002). Reduced forms of these subjective modules are found in many recent standard national household surveys, such as the World Bank's Living Standards Measurement Surveys (LSMS). This type of survey has also been piloted extensively in Brazil and a module has recently been included in that country's biannual national income survey (Migotto *et al.* 2005). Parallel work done by USAID-funded Food and Technical Assistance Project (FANTA) in Burkina Faso (Frongillo and Nanama 2006) and Bangladesh (Frongillo *et al.* 2003) has adapted the US Household Food Security Measure (Hamilton *et al.* 1997; Bickel *et al.* 2000), an experiential measure that has been validated in the USA, to developing country contexts. Most recently, an experiential indicator based on the World Food Program experiential index has been piloted by the South African Department of Agriculture, as part of efforts to establish a South African Food Insecurity Vulnerability Information and Mapping System. (FIVIMS) (Verduijn 2004) and experiential measures have been flagged as priority indicators in subsequent revisions (Banda and NoviAfrica 2007; Department of Agriculture 2007). In the current study, the full CSI was used as an alternate food security indicator to the HDDS.

Validating vulnerability (experiential) indicators for HIV and AIDS contexts

Experiential measures clearly have a wide appeal as household-level food insecurity measures in developing countries and recent work indicates that the types of questions posed in experiential measures are related to by a wide variety of cultures and appropriate to diverse settings, including African countries (Coates *et al.* 2006a). However, a number of key concerns need to be addressed. What aspect of food security are these indices measuring? And are they likely to be relevant in an HIV and AIDS context? A recent analysis conducted by Migotto *et al.* (2005) has cast doubt that experiential measures are good proxies for more quantitative food security measures. They argue that these two categories of indicators are incomparable, as they essentially measure different aspects of food security. A household may regard themselves as hungry, even if there are no recognizable signs

of under-nutrition. Furthermore, even if households are not currently undernourished, they may have a significant probability, or well-founded fear, of future deprivation. In essence, these experiential measures may be sensitive to a household's overall sense of vulnerability, which may be affected by the psycho-social state of the respondent, rather than their actual level of food intake *per se*.

For researchers interested in assessing the "impact" of HIV and AIDS on household food security, these discussions have particular relevance. When researchers speak of detecting an "HIV and AIDS effect" on food security, it is often unclear as to what that nature of this impact will be. Specifically, are we anticipating detecting a decline in the overall quantity of food taken in by a household? In that instance, food security indicators that proxy caloric intake would be needed. Do we expect households to sacrifice key food-groups, such as meat and dairy, in favour of cheaper low-nutrient food groups? If this is the case, overall caloric intake would be insensitive to the "HIV and AIDS effect". Overall HDDS, which is an aggregate index of the total number of food groups consumed, may also be insensitive to this effect if high-quality food-types are simply substituted for by lower-quality ones. Finally, should we anticipate that HIV and AIDS households will show a heightened experience of vulnerability and (food) insecurity, which may or may not be related to actual food intake. If we find the presence of the former, but the absence of the latter, are we to declare that household as truly food insecure, or as simply experiencing a sense of heightened vulnerability that is "only" attributable to the psycho-social aspects of disease? Are these psycho-social aspects of vulnerability actionable, in the sense that they warrant food-aid or policy-level interventions? Or should we argue, with Migotto *et al.* (2005), that self-reported subjective methodologies tend to be systematically biased towards overestimating food insecurity, when we consider them in comparison with quantitative methods? Policy recommendations should thus be tempered somewhat when "only" experiential measures are used.

As a case in point, research conducted by the organisation C-SAFE on the impact of HIV and AIDS on household food security in Zimbabwe used "only" the CSI to compare the food-security status of chronic illness-afflicted versus non-afflicted households. The study found that households with chronic illness reported a higher experience of food quantity insecurity, particularly in terms of eating less-preferred foods and skipping days without eating. Households also reported dietary changes, such as eating only vegetables and wild foods. Although these subjective, user-rated dietary changes were not validated against a quantitative food intake benchmark, the findings were taken to "indicate the need to target chronically ill households who are asset-poor". Policy recommendations were thus phrased in terms of quantifiable, nutritional interventions (Senefeld and Polsky 2005, p.11).

This chapter seeks to contribute to these debates through empirical analyses. First, the association between household HIV and AIDS proxies and household dietary composition is explored through disaggregating the HDDS into its component food groups and then testing for associations between

food groups and HIV and AIDS proxies. Next, the relationship between HIV and AIDS proxies and overall HDDS, as well as total household experience of food insecurity, is explored. The experiential measure is then validated against the HDDS.

METHODS

Study Sites

The study populations were three rural sites in South Africa; the settlement of Moloweni near Mt. Frere in the Eastern Cape Province; and in the Province of KwaZulu-Natal, the Mahlayizeni settlement in Nkandla and the KwaDlangezwa settlement in Zululand. See Chapter 2 for full site descriptions.

Sampling

Data collected over a 12-month period from a total of 307 households was available for analysis after data cleaning and processing. See Chapter 3 for a full description of household sampling criteria and procedures.

Food security indicators

Food security indicators were the HDDS and the CSI. See Chapter 2 for full details on the methods involved in administering these two indicators and the data processing involved.

Household socio-economic and HIV and AIDS profile

Household HIV and AIDS proxies were recorded. See Chapter 2 for a full description of the HIV and AIDS proxies used, as well as information on the household socio-economic and demographic variables collected.

RESULTS

Dietary composition

Diets were of a remarkably monotonous composition, being similar both across sites and between households (Figure 3.1). In all sites, typical breakfasts were either maize porridge or bread, sometimes with jam and margarine served with sweet, black tea (occasionally enhanced with a non-dairy creamer). Lunch was usually dried beans boiled with maize meal or kernels (called *samp*), or a leafy vegetable, often prepared with oil, and served with maize meal. Occasionally, household-members would eat bread and processed meat (*polony*). Supper was usually a repeat of lunch-time or, on occasion, a simple "curry" made with meat and spices. Onions and less frequently carrots, peppers and / or tomatoes were sometimes added to meat or served on their own as a vegetable relish with rice or maize meal. At times, potatoes or taro (*amadumbe*) would be eaten with rice (or on their own) as a meal. Sometimes (especially in Mt. Frere and Nkandla, where cattle were common), soured milk (*amasi*) would be eaten as a meal on its own or as a snack. Generally, however, dairy was not commonly consumed.

Cereals, followed by fats, roots and tubers (which included root vegetables, such as onions, carrots and beetroot) and then sugars, cumulatively comprised more than 65 % of the HDDS food types in all three sites (Figure 3.1). Nkandla, which had the lowest mean HDDS of all sites (see Chapter 2), had the highest proportion of HDDS allocated to these four "staples". In all sites, meat accounted for less than 10 % of the total HDDS.

Given the small range of food groups (HDDS) and food types consumed within the study sites, there was not a large degree of discernment in dietary composition between households of different socio-economic status. The only food group or food type that was significant with household socio-economic status was meat; which was significantly associated with level of long-run household wealth as determined by the PCA-weighted wealth index and household income (χ^2 = 10.61, $p<0.01$; 8.46, $p<0.01$). Overall, meat was most commonly consumed in KwaDlangezwa, where only 2 % of high-income households and 7 % of low-income households failed to register at least one meat product after an effective eight days (over 12-months) of dietary recall. On average, within a 24 hr period, 40 % of households of higher-income households and 33 % of low-income households had consumed meat in KwaDlangezwa. In Nkandla, incidence was 25 % and 20 % and, in Mt. Frere, 17 % and 20 %, for high and low income households respectively. For Mt. Frere and Nkandla, however, the distribution of meat consumption tended to be very left-skewed and, in Mt. Frere, 20 % of low-income households failed to register a single animal-protein food after eight days. Nkandla had

similar figures, with 18 % of low-income households failing to register meat in their HDDS, compared to 7 % for high-income households.

Eggs, dairy, fish and shellfish collectively totalled less than 10 %, and leafy vegetables between 7 and 10 %. When leafy vegetables were consumed, the most common type was cabbage, followed by wild leafy vegetables (*imifino*), pumpkin leaves and chard / spinach leaves (Figure 3.2). Fruit (which included tomatoes and peppers) comprised less than 5 % of the HDDS.

It should be noted that over the entire fieldwork period, having conducted more than 1,000 48 hr recalls, we only saw variation from this dietary pattern on a few isolated occasions. As a result, food-types listed in Figure 3.2 collectively comprised 97 % of the non-animal-source protein foods consumed by all the households in the study over the 12-month assessment period.

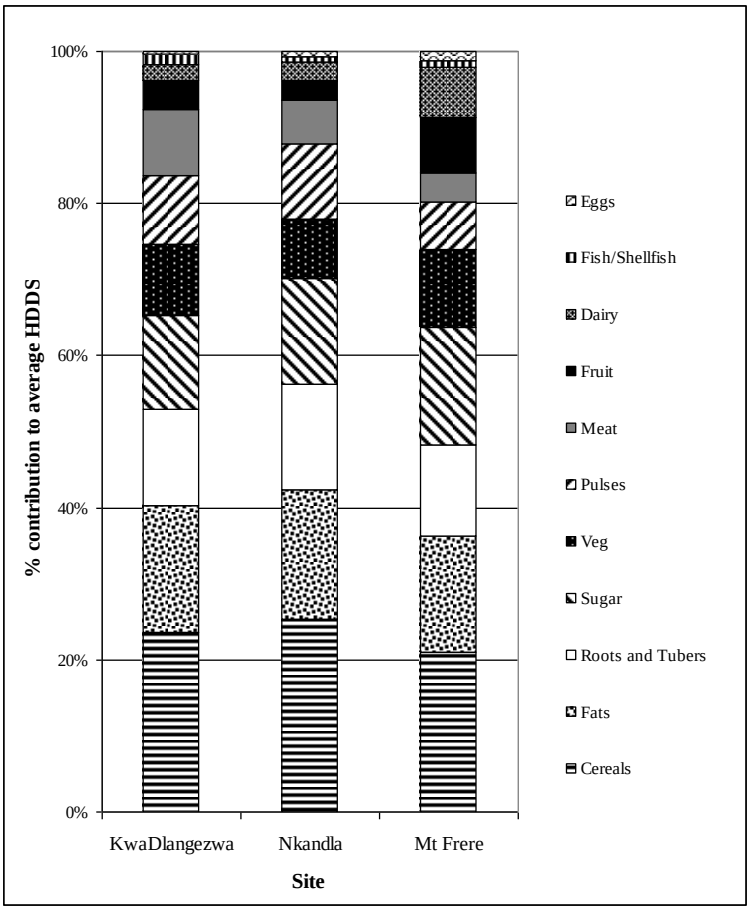
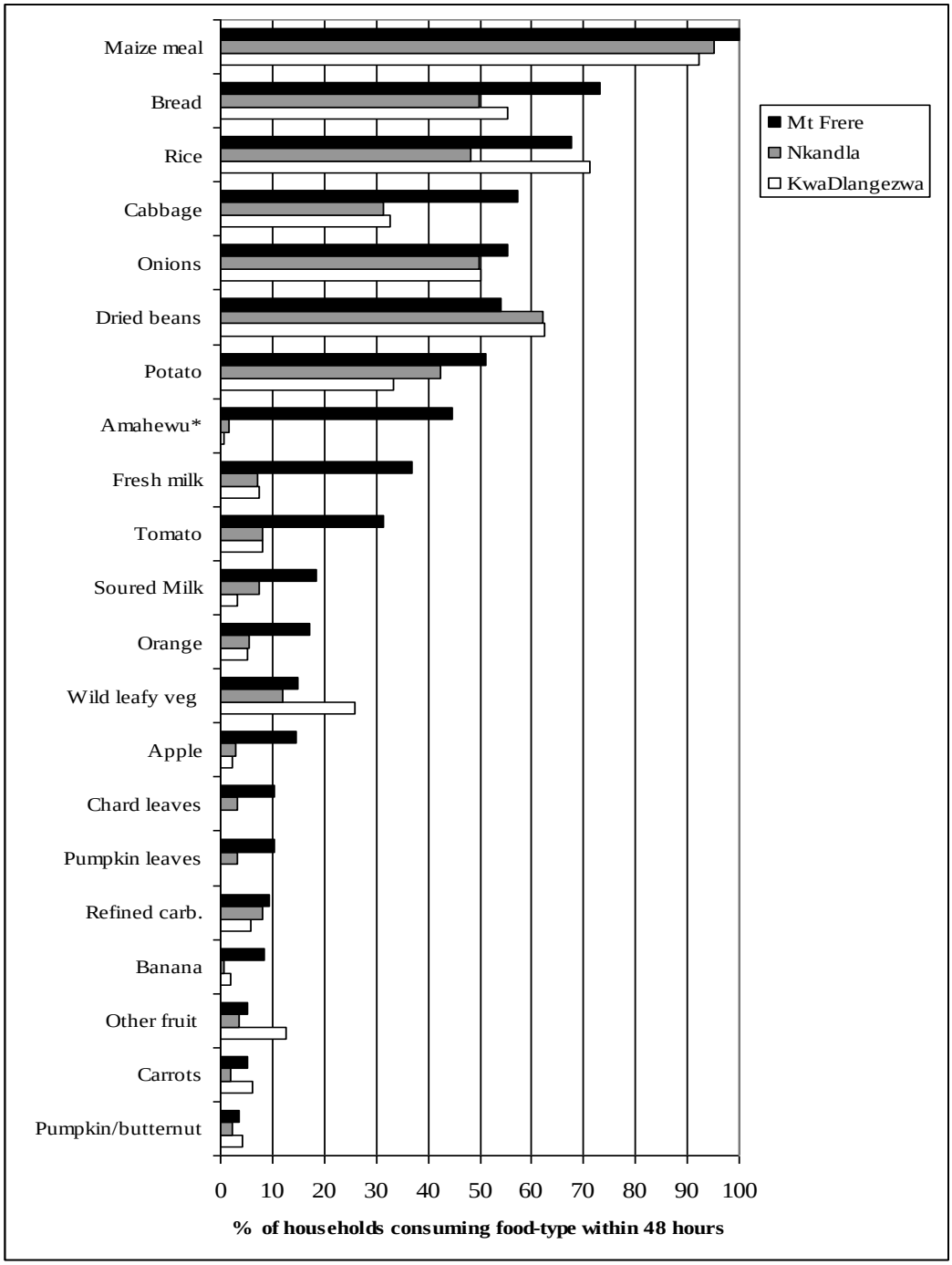


Figure 3.1. The percentage contribution of the eleven component food-groups of the HDDS to the average HDDS in each site.



Note: Food types also consumed, but with prevalence of less than 3 % were "other" dairy (yoghurt, cheese), green beans, sweet potato and taro. * Amahewu, fermented maize drink

Figure 3.2. Prevalence of various food-types consumed in the study sites, as evidenced by their occurrence within the 48 hr recall period.

Relationship between dietary composition and HIV and AIDS

The accumulation of food-groups over an effective eight day period meant that (at both the individual site-level and the pooled-data level) the cumulative count for the number of times a food-group was consumed by a household approximated a normal distribution, with a range from 0 to 8 and a mean in the region of 4. For food groups with counts that did not approximate a normal distribution (fruit, meat, eggs, dairy and fish/shellfish), the data were collapsed into categories for low/medium and high incidence.

Using 2-sample t-tests and contingency tables, analyses were initially conducted for pooled data and then, at a site-disaggregated level, to test if HIV and AIDS proxies were associated with the number of times a food group was eaten over the assessment period. Notably, not one of these tests demonstrated a significant relationship between the frequency distribution of food groups in the HDDS and household HIV and AIDS status. As a result, the outputs of these analyses are not reproduced in this thesis.

Although households may not appear to be adjusting their dietary composition in the presence of HIV and AIDS, it is possible that these households do experience a sensation of food security vulnerability, which results in the restriction of portions or an overall reduction in the total number of food groups consumed over time (HDDS). This scenario is explored in the sections which follow.

Household socio-economic status and food security

Table 3.1. shows the relationship between household socio-economic status and the aggregate food security indicators (the CSI and HDDS). Interestingly, although household income was positively associated with household CSI scores, the same did not hold for HDDS (Table 3.1). However, when household income was scaled to household size, households with high income per capita had significantly higher HDDS scores and lower CSI scores (Table 3.1). Analysis of these relationships disaggregated at the site-level are indicated in Figures 3.3 and 3.4. Figure 3.3 shows that for HDDS, this trend was largely attributable to a strong (statistically significant) relationship between HDDS and income per capita in KwaDlangezwa.

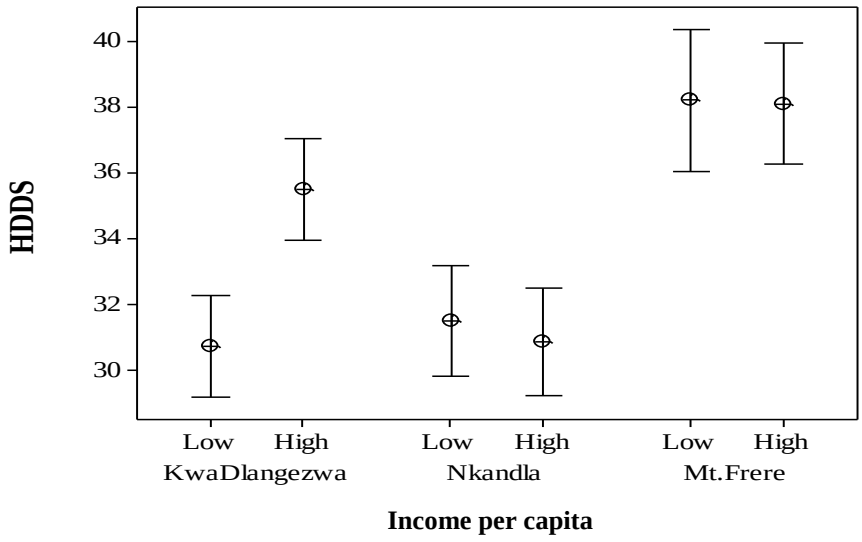


Figure 3.3. Average number of food groups consumed after an effective eight days of dietary recalls, in each site, for households with monthly household income per capita above or below the median of the pooled data. Bars show 95 % confidence intervals for the mean. T-test significant for KwaDlangezwa.

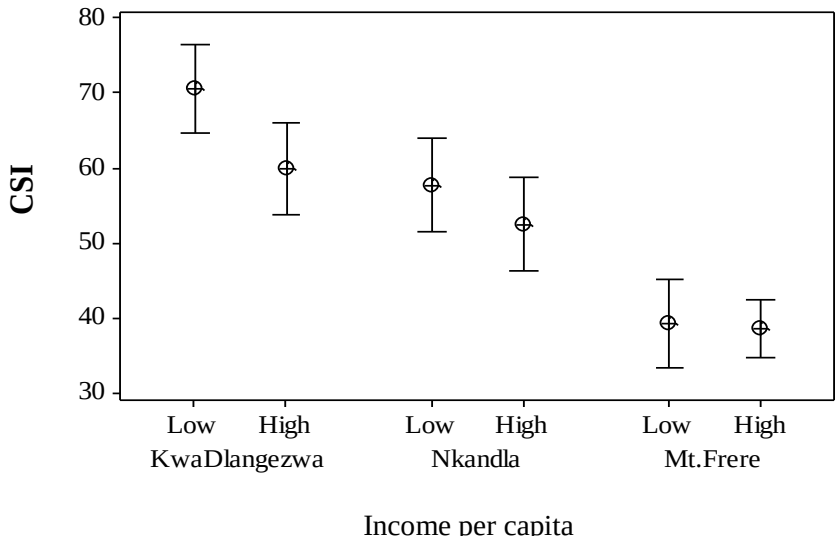


Figure 3.4. Summed CSI after four assessments, in each site, for households with monthly household income per capita above or below the pooled data median.

It is notable that although HDDS was significant with average adult education-level, CSI was not ($p=0.977$). Moreover, whereas the CSI was positively associated with overall household size, with larger households having higher mean CSI scores, HDDS was not associated with household size (Table 3.1). More detailed analysis performed on disaggregated CSI items showed that it was primarily items 1–4 that were most correlated with household size. Item 4 in the CSI, relating to consumption of highly undesirable foods, had the highest positive association with household size (ANOVA $F=5.82$, $p<0.001$; Pearson r correlation coefficient $=0.266$, $p<0.001$).Despite the strong relationship between overall household size and the CSI, it is quite surprising that the accumulation of additional dependents in the household (i.e. non-workers relative to workers and children) did not affect either HDDS or the CSI (Table 3.1). For children, at least, this may be due to the ameliorative effect of child support grants.

Migrancy and food security

The importance of migrant remittances from urban to rural areas is suggested by the positive association between the number of adult absentees from the household and household food security. Both CSI and HDDS scores were significantly improved in households with adult male and/or female absentees (Table 3.1). For example, households with adult female absentees had an average of three additional food groups in their HDDS after four assessments, which translates to a mean of 0.45 additional food groups per day, or 9.1 % higher scores. Similarly, CSI scores were on average 13 % lower after four assessments in households with female absentees. The arrival of an adult female to a household over the assessment period was further associated with CSI scores that were 25 % lower than for households without adult female immigration.

More nuanced analysis disaggregated to the site level shows that although mean CSI scores were consistently lower in households with female absentees in all sites, a statistically significant association between CSI and female absentees was not indicated at the site level. The same was true for site-level HDDS.

Table 3.1. Mean HDDS and CSI scores for pooled data (all sites), grouped by household socio-economic and demographic characteristics. Low/high values of grouping variables correspond to values above or below the pooled data median. ** p<0.05, * p<0.01.

	HDDS summed after four assessments						CSI summed after four assessments					
	Low/absence		High/presence				Low/absence		High/presence			
Grouping Variable	Mean	Std. Dev	Mean	Std. Dev	% diff.	p value of T-stat	Mean	Std. Dev	Mean	Std. Dev	% diff.	p value of T-stat
Wealth Index	33.7	6.98	34.9	7.00	-3.5	0.141	50.9	23.2	54.6	23.5	-7.3	0.169
Earned Income	34.4	7.76	34.1	6.17	0.8	0.725	54.8	24.6	50.7	22.1	7.5	0.121
Grant Income	34.6	6.88	33.9	7.17	1.9	0.414	54.4	24.4	50.4	21.7	7.4	0.129
Total Income	33.8	7.32	34.8	6.62	-2.9	0.214	55.4	25.3	49.9	20.8	9.9	0.039*
Total Education	33.4	7.37	35.2	6.51	-5.4	0.024*	52.7	24.2	52.8	22.6	-0.2	0.977
HH size	34.7	6.82	33.8	7.16	2.5	0.271	49.6	23.4	55.8	23.0	-12.5	0.021*
Income per capita	33.3	7.12	35.3	6.75	-6.0	0.012**	56.3	24.8	49.1	21.3	12.8	0.007**
Non workers per worker	34.2	7.52	34.4	6.47	-0.5	0.832	54.2	23.3	51.3	23.5	5.4	0.273
Number of children	34.7	6.89	33.9	7.10	2.3	0.301	51.3	24.7	54.1	22.1	-5.5	0.298
Ratio children: adults	34.0	7.22	34.5	6.78	-1.4	0.542	52.8	23.8	52.7	23.0	0.2	0.989
Adult females residing	34.3	7.22	34.3	6.88	N/A	0.924	52.0	23.8	53.6	23.0	-3.1	0.600
Adult females left house	34.2	6.98	34.6	7.26	-1.1	0.731	52.8	23.5	52.6	23.0	0.4	0.975
Adult male left	34.1	7.06	35.2	6.59	-3.3	0.343	53.7	23.6	46.2	21.0	14.0	0.049*
Adult female arrived	34.1	6.83	35.4	8.17	-3.7	0.378	54.3	23.3	40.8	20.5	24.9	0.001**
Adult male arrived	34.2	6.89	34.7	8.01	-1.2	0.782	53.5	23.5	45.5	21.3	15.0	0.058
Lost income	34.2	7.14	35.7	4.86	-4.5	0.171	53.3	23.2	45.4	25.0	14.8	0.156
Gained income	34.2	7.17	34.6	6.41	-1.4	0.598	53.7	23.7	49.7	22.1	7.4	0.177
Adult male absentee(s)	33.6	6.11	35.5	8.07	-5.7	0.035*	55.8	23.8	48.0	22.0	14.0	0.003**
Adult female absentee(s)	32.9	6.17	35.9	7.59	-9.1	0.001**	56.0	22.9	48.7	23.4	13.0	0.006**

* % diff. = % difference between the means of low/absence and high/presence

Relationship between HDDS and CSI

HDDS showed very good collation with the CSI (Figure 3.5). The two indices were negatively correlated, with a Pearson correlation coefficient of r = -0.496 ($p<0.001$). In regressions, the r^2 value was 24.4 %. Contingency tables (not shown here) exploring associations between high / low HDDS and CSI scores were also highly significant ($p<0.001$) and low CSI scores were consistently, and significantly, associated with high HDDS.

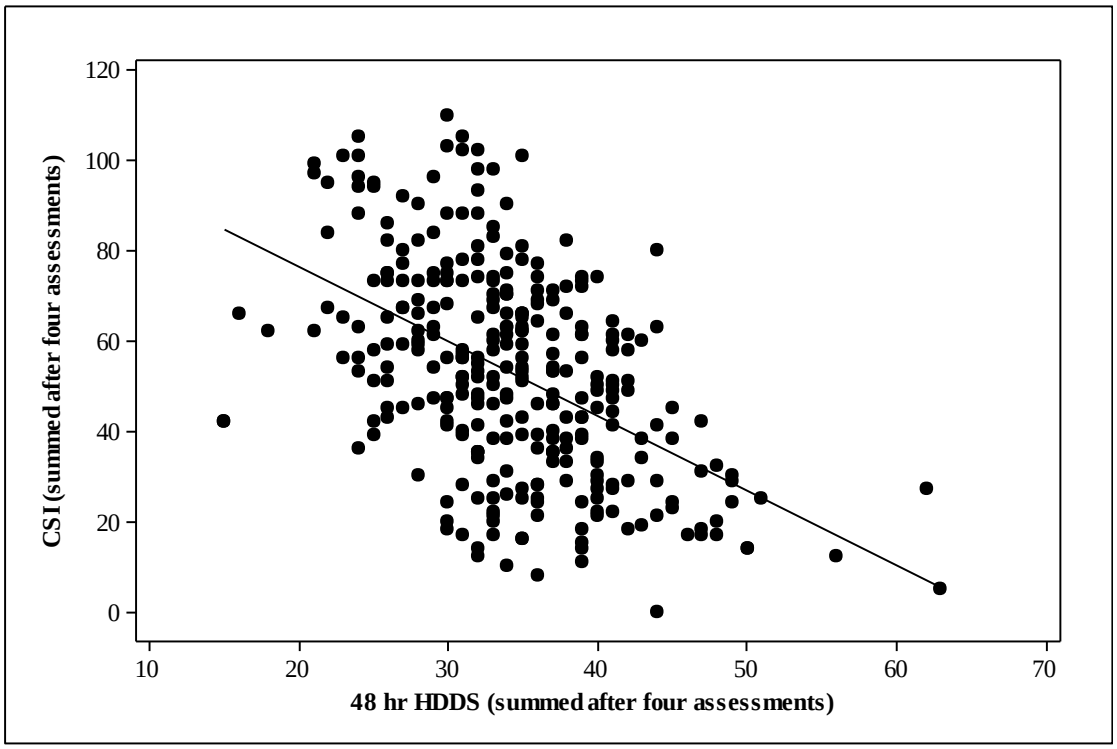


Figure 3.5. Scatter plot of HDDS and CSI, showing fitted linear regression line.

CSI=109.3-1.65HDDS, r^2 = 24.4 %, n=307, $p<0.01$.

When data were disaggregated by site, KwaDlangezwa and Nkandla demonstrated a significant relationship between HDDS and CSI (KwaDlangezwa, r=-0.40, r^2=16.3 %; Nkandla r=-0.49, r^2=24.6 %). In Mt. Frere, however, the relationship was weaker, probably due to the fact that the intra-site variance in the Mt. Frere scores was much lower relative to the pooled site variance (Mt. Frere, r= - 0.32, r^2=10.5 %) (Figure 3.6).

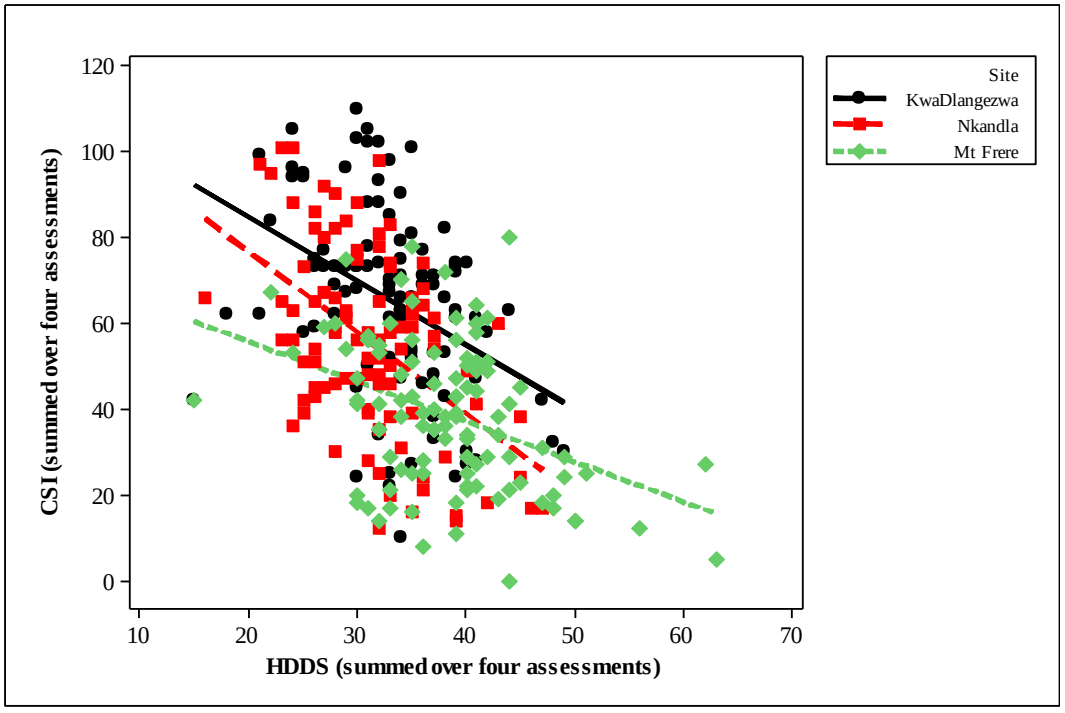


Figure 3.6. Scatter plot showing CSI and HDDS, with separate regression lines fit for each site.

Relationship between HIV and AIDS and household food security

Given the good collation between HDDS and the CSI (see above), it is somewhat surprising that HDDS and CSI showed markedly different patterns of association with HIV and AIDS proxies (Table 3.2). Whereas CSI was highly significant with chronic illness, orphan fostering (provided the child was without child-welfare support), and recent mortality in all the analysed demographics; HDDS was only significantly associated with presence of person(s) with chronic illness (0–59 yrs) in the household.

In the section on dietary composition and HIV and AIDS, the analysis suggested that, given the exceptionally low range of food groups and food types consumed in the study sites, households may have limited options for coping with food security vulnerability through switching (or adjusting) the food-groups that comprise the HDDS. Given this, if households were subject to heightened food security vulnerability, it may be more likely that they would cope not by cutting back or substituting food groups, but rather by either restricting the quantity of food consumed, and / or changing the source through which the food-groups is acquired (e.g. switching from adequate portions of purchased vegetables to possibly restricted portions of wild, cultivated or donated vegetables).

Table 3.2. Mean HDDS and CSI scores for pooled data (all sites), grouped by presence or absence of household HIV and AIDS proxies. ** p<0.05, * p<0.01

	HDDS (summed after four assessments)						CSI (summed after four assessments)					
	Absence		Presence				Absence		Presence			
Grouping Variable	Mean	Std. Dev	Mean	Std. Dev	% diff.	p value of T-stat	Mean	Std. Dev	Mean	Std. Dev	% diff.	p value of T-stat
Death (0–59 yrs)	34.3	7.01	34.1	7.01	0.6	0.806	51.7	23.0	55.1	24.3	-6.6	0.268
Death (18–64 yrs)	34.4	7.03	33.9	6.95	1.5	0.542	51.4	23.0	56.0	24.1	-8.9	0.133
Death with CI (0–59 yrs)	34.3	6.91	33.9	7.27	1.2	0.580	51.5	22.8	56.4	24.7	-9.5	0.120
Death with CI (18–64 yrs)	34.6	6.97	33.4	7.06	3.2	0.228	51.0	22.9	57.8	24.3	-13.3	0.034*
Deceased Female (18–59)	34.2	6.97	34.7	7.14	-1.4	0.621	51.8	23.1	56.1	24.3	-8.3	0.200
Deceased Male (18–59)	34.4	6.82	34	7.79	1.2	0.721	52.7	23.1	53.0	24.8	-0.6	0.929
CI (any age)	35.3	6.60	33.9	7.12	4.0	0.131	43.8	22.2	56.1	23	-28.1	<0.001**
CI (0–59)	35.3	7.39	33.3	6.47	5.8	0.010*	45.9	22.8	58.5	22.3	-27.5	<0.001**
CI (18–64)	34.8	7.04	33.7	6.93	3.3	0.151	47.2	22.4	58.7	23	-24.4	<0.001**
CI FT (0–59)	34.4	7.19	34.1	6.69	1.0	0.683	48.9	22.9	59.2	22.9	-21.1	<0.001**
CI FT (18–64)	34.4	7.10	34.1	6.83	0.9	0.700	49.4	23.0	59.3	22.8	-20	<0.001**
Sustained CI over four assessments	35.1	6.37	33.9	7.29	3.4	0.142	46.4	23.1	56.1	22.9	-20.9	0.001**
Worsening CI over four assessments	34.8	6.53	33.6	7.51	3.6	0.126	46.3	21.0	60.9	23.7	-31.5	<0.001**
Improvement in health	34.1	6.61	34.6	7.78	-1.5	0.571	52.3	23.7	53.4	22.7	-2.1	0.748
Maternal Orphan	34.1	6.70	34.6	7.74	-1.5	0.602	51.3	23.6	56.4	22.3	-9.9	0.078
Maternal Orphan (Grant)	34.1	6.83	35.5	7.88	-4.3	0.236	52.7	23.9	53.1	20.1	-0.8	0.901
Maternal Orphan (No Grant)	34.5	6.82	33.4	7.63	3.3	0.284	50.9	23.5	60.0	21.7	-17.9	0.004**
Paternal Orphan	34.5	6.48	34.2	7.53	0.8	0.826	49.6	23.1	56.0	23.2	-12.9	0.016*
Paternal Orphan (Grant)	34.2	6.83	34.5	7.41	-0.7	0.283	51.8	23.4	55.0	23.2	-6.2	0.283
Paternal Orphan (No Grant)	34.6	6.67	33.7	7.52	2.8	0.249	49.6	23.0	58.2	23.1	-17.3	0.002**
Double Orphan	34.3	7.10	33.4	6.54	2.7	0.269	51.9	23.0	56.5	24.7	-8.9	0.193
Double Orphan (Grant)	34.1	6.78	35.6	8.32	-4.6	0.266	51.8	23.7	54.9	22.6	-6.0	0.269
Double Orphan (No Grant)	34.6	6.91	32.7	7.31	5.4	0.102	49.7	23.1	57.3	23.1	-15.3	0.005**

In order to explore the hypothesis that high CSI scores were attributable to reduction in the amount of food quantity consumed, a PCA was run on the 16 items in the CSI. The objective of this analysis was to determine the "aspect" of food insecurity (e.g. psychological aspects of worry, food diversity restriction, food quantity restriction, reactive or augmentative strategies, etc.) that explains the highest proportion of the variance in the CSI. The PCA found that the first principle component was dominated by experience of food resource restriction items (first eight items) in the CSI. Of these, the highest loadings were allocated to items which indicated a restriction of food quantity as opposed to food diversity; such as eating fewer meals in the day, having smaller meals, and not having any food at all in the house. The results of this PCA analysis (Table 3.3) strongly suggests that a high CSI score is associated with an insufficient quantity of food in the household. Households afflicted with HIV and AIDS proxies may thus be prone to this food quantity restriction.

Table 3.3. Results of a principle components analysis on the 16 items of the CSI. Values for CSI items were the total number of assessments (0–4) at which the household indicated a positive response to the CSI item, over 12-months.

	CSI item	Factor loadings	
		PC 1	PC 2
1	Worry over food	0.292	-0.195
2	Eat less preferred foods	0.273	-0.278
3	Limited variety	0.256	-0.287
4	Embarrassing foods	0.284	-0.315
5	Smaller portions than needed	0.356	0.051
6	Eat fewer meals	0.440	-0.152
7	No food in house	0.388	0.154
8	Go to sleep hungry	0.309	0.289
9	Not eat for whole day	0.105	0.242
10	Borrow from friends	0.181	0.112
11	Sell stock	0.105	0.242
12	Buy on credit	0.085	0.397
13	Gather wild foods	0.040	-0.028
14	Hunt for food	0.015	0.019
15	Harvest immature crops	0.027	0.337
16	Work for food	0.031	0.209
	Eigenvalue	8.534	2.768
	Proportion	0.404	0.130
	Cumulative	0.404	0.534

Next, site-disaggregated analyses were performed in order to explore how the relationship between HIV and AIDS proxies and household food security varies at a site-specific level.

Chronic illness effects at the site level

Chronic illness (in a number of age-categories) was significantly associated with pooled CSI scores (Table 3.2). Site-disaggregated analyses indicated that the positive association between the CSI and chronic illness for pooled data was suggested by mean trends in all three sites (Figure 3.7), although none of these trends were statistically significant at the site-level.

The association between persistent and worsening chronic illness and the experience of food security was explored at the site-disaggregated level. Overall, the relationship between worsening health over time and the CSI was strongest in KwaDlangezwa (Figure 3.8). Nkandla also showed a tendency towards heightened mean food insecurity in households afflicted with deteriorating health, but these trends were not statistically significant at the site-level. In Mt. Frere, there was not an evident trend towards mean differences in CSI scores for chronic illness afflicted and non-afflicted households.

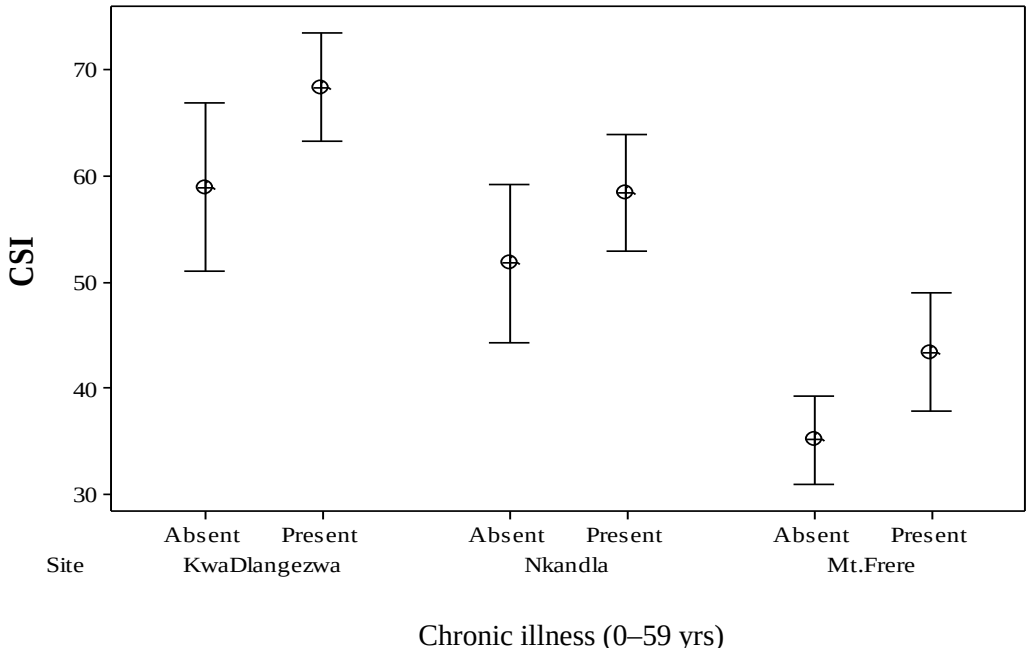


Figure 3.7. Average CSI summed over four assessments, disaggregated by site, for households with and without one or more individuals (0–59 yrs) with chronic illness.

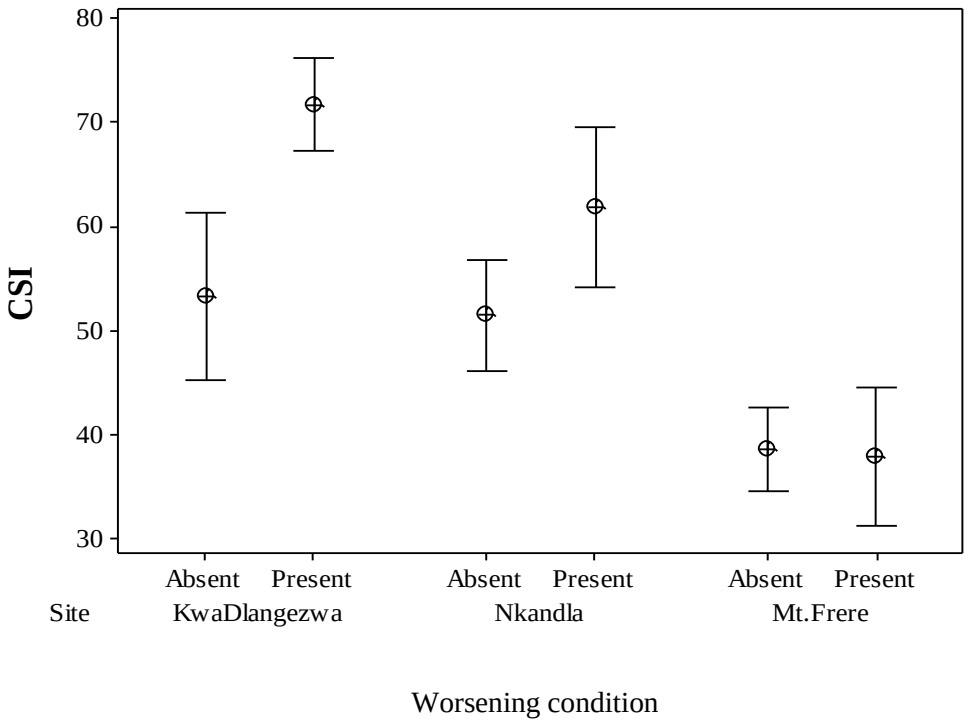


Figure 3.8. Average CSI summed over four assessments, disaggregated by site, for households with and without a household member with health that was described as "worsening" over the 12-month assessment period.

Chronic illness (0–56 yrs) was the only HIV and AIDS proxy that was significantly associated with HDDS in the pooled data analysis (Table 3.2). However, site-disaggregated analysis raises some serious doubts as to the reliability of this finding, as mean differences in HDDS with chronic illness are only evidenced by lower mean scores in KwaDlangezwa, and even these were not statistically significant (Figure 3.9). Given this, it is likely that the relationship between HDDS and chronic illness in the pooled data analysis is attributable to the slightly higher incidence of chronic illness in KwaDlangezwa, which tends to weight the pooled analysis in favour of this KwaDlangezwa-specific trend.

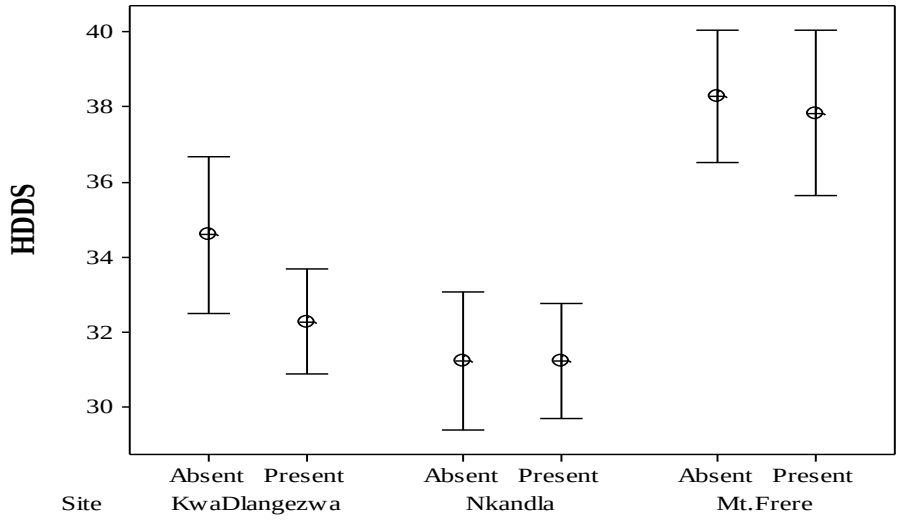


Figure 3.9. Average HDDS, summed over four assessments, disaggregated by site, for households with and without a household member (0–59 yrs) with chronic illness.

Orphan fostering effects at the site level

At the pooled site-level, fostering of maternal, paternal and double orphans was only significantly associated with the CSI when one or more of the orphans in the household were without a child-support grant (R210 or US$21 per month, per child). Site-disaggregated analyses show that although this trend was not statistically significant at the site-level, all sites showed a consistent trend towards heightened CSI in orphan-fostering households. Paternal orphan-fostering in particular was associated with lower mean CSI scores, (Figure 3.10).

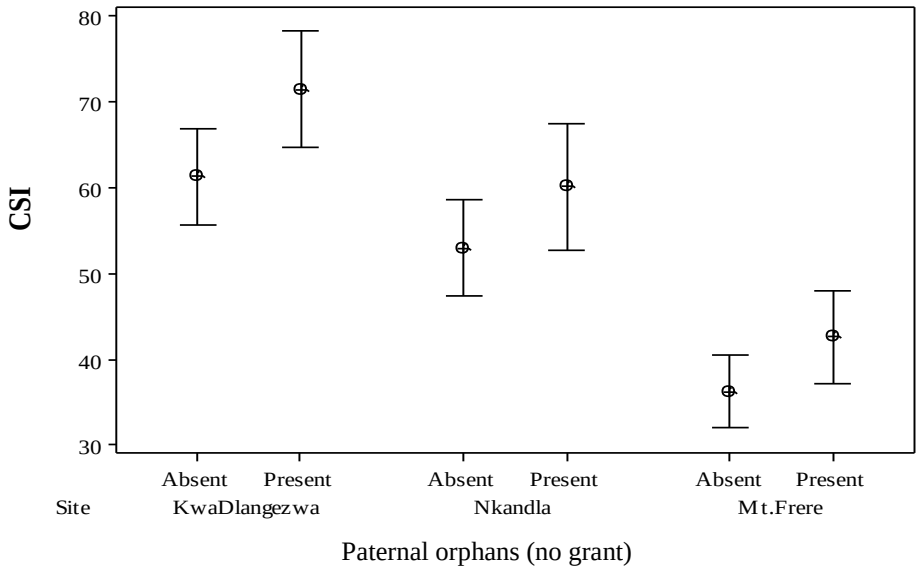


Figure 3.10. Average CSI summed over four assessments, disaggregated by site, for households with and without one or more paternal orphans without a child-support grant.

Mortality effects at the site level

Although recent mortality was associated with a higher experience of food insecurity in the pooled data, at the site-specific level only KwaDlangezwa showed statistically significant increases in CSI levels in mortality-afflicted households. This effect was statistically significant for all proxy age-demographics. The association between CSI and recent mortality of a household member aged 0-59 yrs is shown in Figure 3.11, below.

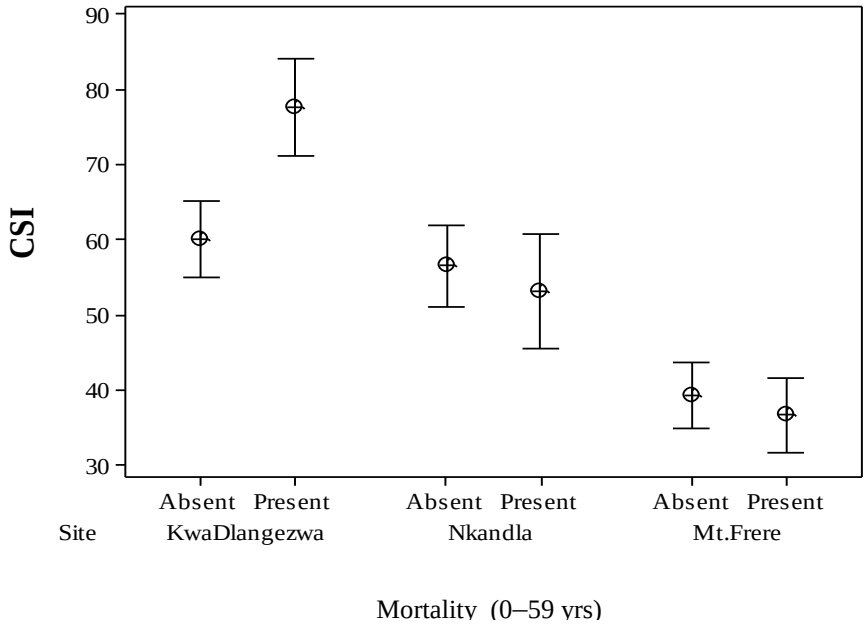


Figure 3.11. Average CSI summed over four assessments, disaggregated by site, for households with and without one or more mortalities (0–59 yrs) within the last 2 years.

Influence of wealth status on the relationship between HIV and AIDS and food security

As the CSI was associated with household income per capita (Table 3.1), it is possible that the trends observed between the CSI and household HIV and AIDS proxies are due to a lower household wealth status in HIV and AIDS afflicted households. This would be in keeping with the view that HIV and AIDS is associated with lower household income and expenditure. If this relationship is significant, it may be that the association of household HIV and AIDS proxies with household food security can be primarily by household socio-economic status, and not necessarily and HIV and AIDS effect *per se* (e.g. Twine and Hunter 2008).

In order to explore this possibility, the association between household wealth status and household HIV and AIDS proxies was explored. These analyses indicated that that there was no statistically significant relationship between earned income and household HIV and AIDS proxies for mortality (Table 3.4), chronic illness (Table 3.5) or orphan-fostering (Table 3.6). However, in Nkandla and Mt Frere, grant income was significantly higher in households with paternal orphans (Table 3.6), and in Mt. Frere the PCA-weighted wealth index was significantly lower for households with mortality.

Table 3.4. Relationship between presence or absence of mortality (0–59 yrs) in the household, and household wealth status. Means are for untransformed data. P-values based on t-statistic for 2-sample t-tests or W-statistic for Mann–Whitney test, depending on the distribution of the variable.

	KwaDlangezwa					Nkandla					Mt. Frere				
Recent (last 2 yrs) mortality (0-59 yrs)															
	Present n=30		Absent n=72		p	Present n=29		Absent n=68		p	Present n=33		Absent n=75		p
	Mean	Std.Dev	Mean	Std.Dev		Mean	Std.Dev	Mean	Std.Dev		Mean	Std.Dev	Mean	Std.Dev	
Earned income	1,874	2,801	1,349	2,422	0.344	1,274	2,180	1,047	1,583	0.566	1,253	1,980	1,523	3,263	0.661
Grant income	936	601	1,038	716	0.495	1,081	882	989	850	0.633	1,112	750	935	809	0.287
Total income	2,810	2,822	2,387	2,517	0.458	2,354	2,396	1,956	1,981	0.397	2,365	1,971	2,458	3,241	0.879
Per capital income	457	544	373	379	0.373	298	267	312	364	0.857	759	1,181	649	844	0.583
Average adult edu.	3.1	0.8	3.2	1.0	0.76	3.3	0.8	3.0	1.0	0.115	3.2	0.8	3.3	1.1	0.689
PCA wealth index	1.1	0.8	1.3	0.8	0.196	0.8	0.6	0.6	0.6	0.163	0.7	0.5	1.0	0.7	0.018*
Sum livestock	0.1	0.1	0.4	1.5	0.261	3.9	6.7	3.3	4.7	0.623	2.5	7.7	3.2	5.8	0.592
Recent (last 2 yrs) mortality (0–59 yrs) with CI															
	Present n=28		Absent n=74		p	Present n=24		Absent n=73		p	Present n=28		Absent n=80		p
	Mean	Std.Dev	Mean	Std.Dev		Mean	Std.Dev	Mean	Std.Dev		Mean	Std.Dev	Mean	Std.Dev	
Earned income	1,561	2,003	1,482	2,723	0.888	1,344	2,373	1,039	1,541	0.468	1,278	2,073	1,497	3,178	0.735
Grant income	922	616	1,040	708	0.438	1,231	885	946	840	0.158	1,019	752	978	810	0.814
Total income	2,483	2,065	2,522	2,793	0.947	2,575	2,549	1,911	1,935	0.182	2,298	2,011	2,475	3,166	0.782
Per capital income	380	362	404	459	0.802	324	282	302	355	0.787	625	739	703	1,023	0.711
Average adult edu.	3.1	0.8	3.2	1.0	0.554	3.3	0.8	3.0	1.0	0.213	3.2	0.8	3.3	1.1	0.474
PCA wealth index	1.0	0.8	1.3	0.8	0.107	0.8	0.6	0.6	0.6	0.201	0.6	0.6	1.0	0.7	0.018*
Sum livestock	0.1	0.1	0.4	1.5	0.297	3.9	7.3	3.3	4.6	0.61	2.7	8.3	3.1	5.7	0.8

Table 3.5. Relationship between presence or absence of chronic illness (0–59 yrs) in the household, and indicators of household wealth status.

	KwaDlangezwa					Nkandla					Mt. Frere				
Chronic Illness (0–59 yrs)															
	Present n=68		Absent n=34			Present n=55		Absent n=42			Present n=44		Absent n=64		
	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	p
Earned income	1,391	2,377	1,729	2,853	0.528	919	1,583	1,371	1,987	0.215	1,684	3,998	1,273	1,883	0.475
Grant income	1,019	699	986	658	0.821	1,125	932	875	731	0.155	1,051	782	946	802	0.5
Total income	2,409	2,482	2,715	2,859	0.578	2,043	1,937	2,117	2,338	0.866	2,735	3,925	2,219	1,920	0.366
Per capital income	343	376	506	519	0.073	288	363	333	302	0.521	548	877	775	1001	0.225
Average adult edu.	3.3	1.0	3.0	1.0	0.248	3.3	0.8	2.9	1.1	0.041*	3.3	0.9	3.3	1.1	0.836
PCA wealth index	1.2	0.8	1.3	0.8	0.729	0.7	0.7	0.7	0.5	0.811	1.0	0.7	0.8	0.6	0.294
Sum livestock	0.4	1.5	0.2	0.3	0.404	3.6	6.2	3.3	4.2	0.789	4.0	7.0	2.3	5.9	0.169
Chronic Illness (0–59 yrs) with free treatment															
	Present n=47		Absent n=55			Present n=33		Absent n=64			Present n=34		Absent n=74		
	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	p
Earned income	1,408	2,480	1,586	2,604	0.726	836	1,093	1,258	2,032	0.269	1,434	3,870	1,443	2,401	0.988
Grant income	962	731	1,047	643	0.534	1,208	998	918	762	0.115	1,048	800	962	792	0.603
Total income	2,369	2,590	2,632	2,633	0.614	2,043	1,495	2,092	2,375	0.915	2,482	3,869	2,405	2,363	0.899
Per capital income	357	427	432	439	0.386	265	243	330	376	0.372	478	897	777	972	0.131
Average adult edu.	3.3	0.9	3.1	1.0	0.202	3.2	0.8	3.0	1.0	0.31	3.5	1.0	3.2	1.0	0.208
PCA wealth index	1.1	0.8	1.3	0.8	0.239	0.7	0.6	0.7	0.6	0.747	0.9	0.7	0.9	0.6	0.496
Sum livestock	0.5	1.8	0.1	0.3	0.131	4.1	7.4	3.1	4.0	0.356	4.2	7.4	2.4	5.9	0.183

Table 3.6. Relationship between presence or absence of maternal, paternal and double orphans in the household, and indicators of household wealth status.

	KwaDlangezwa					Nkandla					Mt.Frere				
Maternal Orphan(s)															
	Present n=34		Absent n=68			Present n=23		Absent n=74			Present n=29		Absent n=79		
	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	p
Earned income	1,645	2,252	1,433	2,680	0.693	963	1,420	1,162	1,876	0.641	1,021	1,646	1,594	3,266	0.369
Grant income	1,192	743	916	636	0.054	1,171	1,041	969	792	0.325	1,265	875	887	739	0.027*
Total income	2,836	2,264	2,349	2,759	0.375	2,133	1,518	2,057	2,270	0.880	2,286	1,585	2,482	3,263	0.758
Per capital income	372	329	410	479	0.681	324	309	302	347	0.786	750	722	658	1,030	0.66
Average adult edu.	3.3	0.7	3.1	1.1	0.555	3.1	0.7	3.1	1.0	0.786	3.0	0.8	3.4	1.1	0.030*
PCA wealth index	1.3	0.8	1.2	0.8	0.938	0.8	0.6	0.7	0.6	0.481	0.8	0.6	0.9	0.6	0.345
Sum livestock	0.5	1.9	0.2	0.8	0.384	3.4	6.1	3.4	5.2	0.997	2.7	8.1	3.1	5.7	0.802
Paternal Orphan(s)															
	Present n=54		Absent n=48			Present n=39		Absent n=58			Present n=57		Absent n=51		p
	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	p	Mean	Std.Dev.	Mean	Std.Dev.	
Earned income	1,341	2,049	1,687	3,004	0.494	945	1,758	1,229	1,790	0.442	1,047	1,758	1,880	3,803	0.140
Grant income	1,131	721	868	615	0.052	1,232	922	872	783	0.041*	1,229	832	720	654	0.001**
Total income	2,472	2,080	2,555	3,112	0.873	2,038	2,041	2,101	2,171	0.886	2,276	1,718	2,600	3,830	0.566
Per capital income	360	333	439	524	0.359	255	206	343	400	0.211	741	1,088	617	785	0.502
Average adult edu.	3.1	0.8	3.3	1.1	0.41	3.2	0.9	3.0	1.0	0.319	3.3	1.0	3.3	1.0	0.870
PCA wealth index	1.2	0.8	1.3	0.8	0.381	0.8	0.7	0.6	0.6	0.388	0.9	0.6	0.9	0.7	0.807
Sum livestock	0.4	1.7	0.1	0.4	0.217	3.2	4.9	3.6	5.7	0.755	3.0	6.8	3.0	6.1	0.970

Double Orphan(s)															
	Present n=22		Absent n=80		p	Present n=16		Absent n=81		p	Present n=20		Absent n=88		p
	Mean	Std.Dev.	Mean	Std.Dev.		Mean	Std.Dev.	Mean	Std.Dev.		Mean	Std.Dev.	Mean	Std.Dev.	
Earned income	1,055	1,804	1,627	2,700	0.351	1,013	1,405	1,135	1,845	0.804	1,193	2,085	1,497	3,091	0.677
Grant income	1,139	707	972	676	0.312	938	1,001	1,032	830	0.691	1,157	922	951	760	0.295
Total income	2,194	1,894	2,599	2,771	0.521	1,613	1,391	2,167	2,219	0.34	2,350	1,869	2,447	3,098	0.893
Per capital income	317	281	420	465	0.329	292	363	311	334	0.839	641	1,112	692	922	0.828
Average adult edu.	2.8	0.8	3.3	1.0	0.053	3.1	0.9	3.1	0.9	0.96	2.9	0.9	3.4	1.0	0.060
PCA wealth index	1.2	0.8	1.2	0.8	0.94	0.7	0.7	0.7	0.6	0.805	0.8	0.5	0.9	0.7	0.667
Sum livestock	0.6	2.3	0.2	0.7	0.141	3.3	4.9	3.5	5.5	0.91	2.9	5.9	3.0	6.6	0.956

Although the relationship between HIV and AIDS and wealth status was not statistically significant, it is notable that the means of many of the wealth indicators were lower in HIV and AIDS-afflicted households, and the failure to detect statistical significance may be as a result of inadequate sample-size. That been said, it is apparent from the data at hand that mean household wealth-status alone is of little use in accounting for the heightened experience of food insecurity seen in HIV and AIDS-afflicted households.

Although mean household wealth status is not significantly different in HIV and AIDS afflicted households, there are indications from other studies to suggest that *relationship* between experiential indicators and income can vary widely, and may be heavily influenced by co-variates. For example, Hamilton *et al.* (1997) reported only a weak correlation between income and the US food security measure (a experiential measure upon which the CSI is based), with correlation coefficients ranging from -0.12 to -0.33, depending on the definition of income utilised. In contrast, Coates *et al.* (2006b) found in Bangladesh a much stronger relationship between household experience of food insecurity and income (correlation coefficients of 0.42 to 0.44), demonstrating the relationship can co-vary widely with locality.

Given these considerations, it is possible that household HIV and AIDS status may be a significant co-variant in the relationship between household income and household experience of food insecurity. In order to explore this hypothesis, the Nkandla data-set (which overall did not show a significant relationship between household income and CSI) was disaggregated by presence or absence of HIV and AIDS proxies indicated as significant in the pooled HIV and AIDS analyses in Table 3.2. Alternate analyses were run to explore the relationship between income and household food security with household HIV and AIDS proxies as covariates. Using this approach, a somewhat different picture of the relationship between household income and CSI emerges (Figure 3.12).

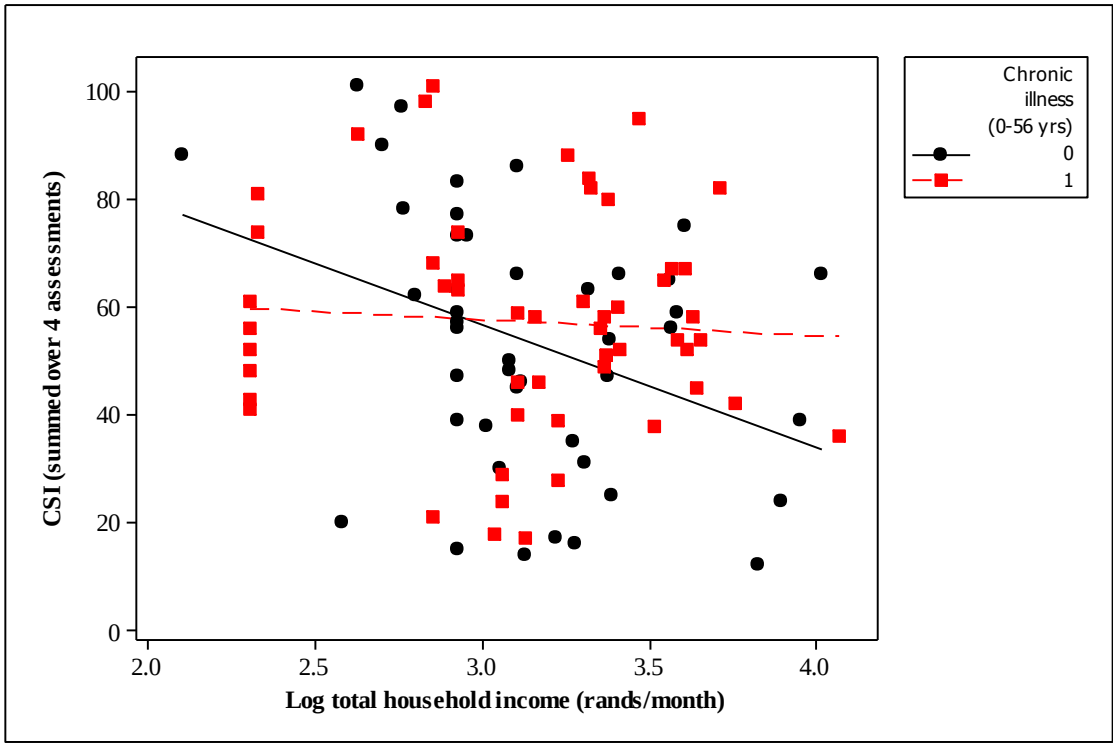


Figure 3.12. Scatter-plot of the Nkandla data set, showing total CSI and log total household income in households with and without chronic illness (0–56 yrs).

Fitted linear regression lines for each group are indicated.

A plot of CSI regressed against household income that adjusts for presence of chronic illness (0–59 yrs) in the household shows that whereas for non-afflicted households there is a negative relationship between household income and CSI ($r = -0.30$, $r^2 = 9.1$ %, $p=0.048$) the relationship is not significant for afflicted households ($r = -0.13$, $r^2 = 1.6$ %, $p=0.417$). This same trend is expressed in a different manner in Figure 3.13 which shows that for households without chronic illness, mean CSI is considerably lower in less-poor households, whereas for households with chronic illness, the mean CSI is very similar for low-income and high-income households. One possible interpretation of this trend is that for households with chronic illness, high income does not appear to have the ameliorative effect on household food security that one would anticipate: wealthy households with chronic illness are still more food insecure than wealthy households without chronic illness.

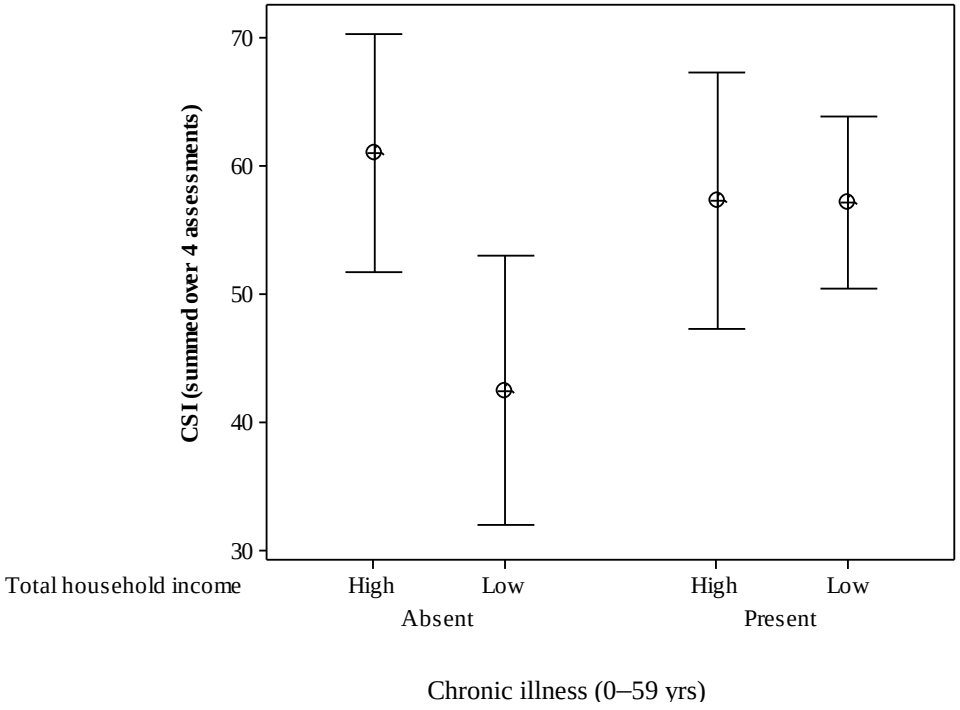


Figure 3.13. Interval plots of the mean cumulative CSI in Nkandla households of high and low household income (relative to the pooled data median), given presence or absence of chronic illness (0–56 yrs) in the household.

Turning now to the KwaDlangezwa data-set, we see similar trends for the relationship between household income and the CSI, when adjusting for whether households are fostering double orphans (no grants) or not (Figure 3.14). For fostering households, there is a significant relationship between household income and CSI ($r = - 0.354$, $r^2 = 12.6$ %, $p<0.01$). However, for households fostering orphans without grants, there was no significant relationship between income and CSI ($r= -0.041$, $r^2 < 0.01$, $p=0.849$), suggesting that even comparatively well-off households with orphans and no grants are more food insecure than well-off households without orphans.

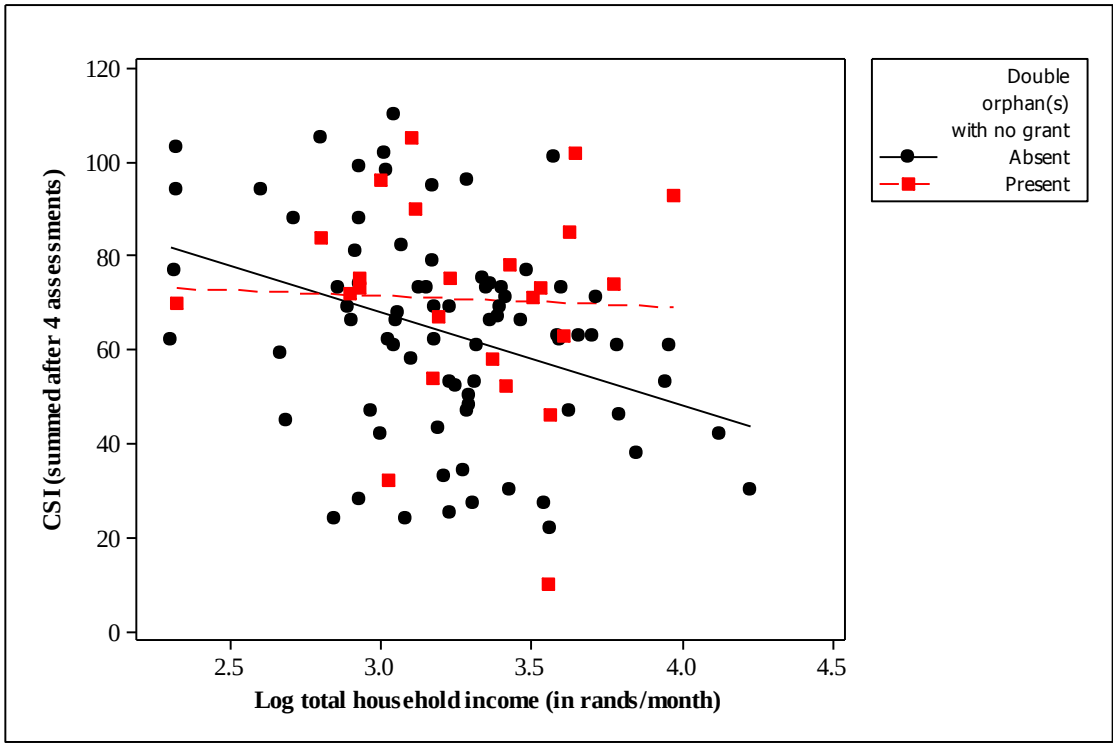


Figure 3.14. Scatter-plot of the KwaDlangezwa data set, showing total CSI and log total household income in households with and without double orphans (without a grant).

Fitted linear regression lines for each group are indicated.

At this point, this hypothesis is somewhat speculative. The picture is also highly complex. This relationship is not evident for all HIV and AIDS proxies, and in all sites. For example, comparative analyses on the Mt. Frere data-set failed to indicate a strong relationship between household income and CSI whether controlling for household HIV and AIDS proxies or not. As indicated in earlier sections, this may be because in Mt. Frere, the income of the resident household members is not the primary factor determining food security status – migrant remittances are. In KwaDlangezwa and Nkandla, however, food security may be more strongly tied to the earning-status of resident household members, and thus current household income.

Another complicating factor is that there is some evidence to suggest that household with recent mortality may have a different food security response to households registering morbidity and orphan-fostering proxies. Separate-slope regressions conducted on the KwaDlangezwa data-set which adjusted for the presence of recent mortality in the household rendered parallel lines, that is, tests for homogeneity of slopes were not significant (Figure 3.15). This indicates that

although households with recent mortality have on average lower CSI scores, as indicated by significantly lower y-intercepts. the coefficient in the regression equations that expresses the relationship between income and CSI does not differ significantly between the groups. This suggests that households with recent mortality are on average more food insecure, but that income has an ameliorative effect on this food insecurity.

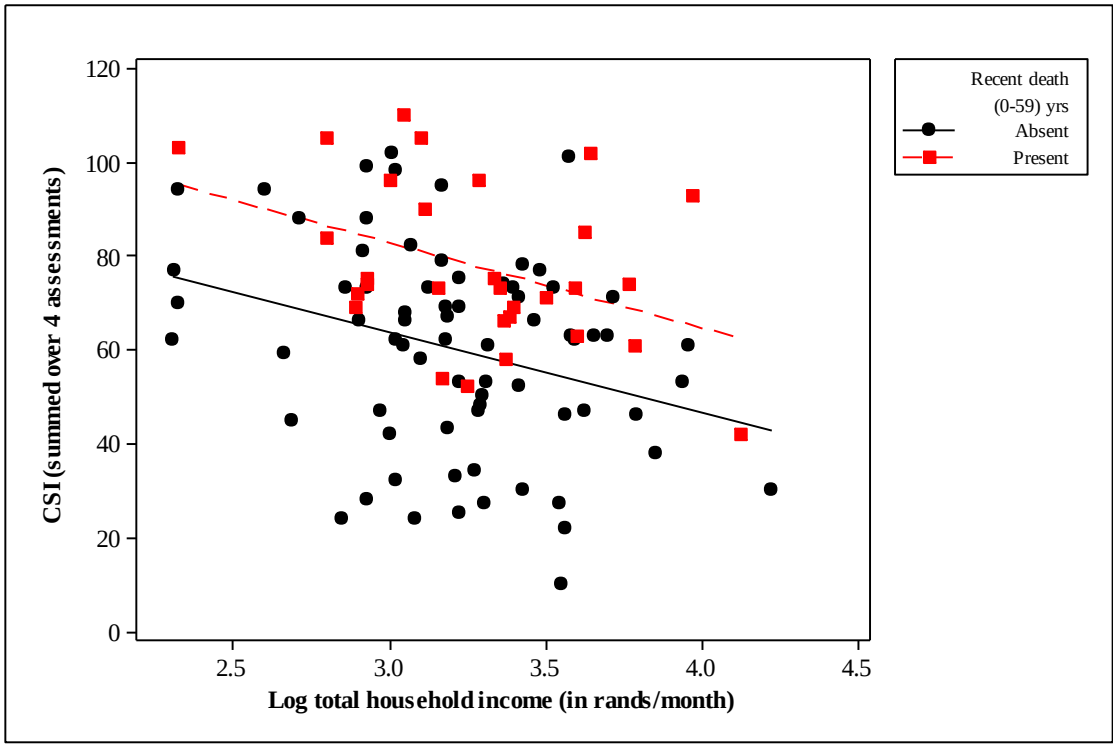


Figure 3.15. Scatter-plot of the KwaDlangezwa data set, showing total CSI and log total household income in households with and without recent mortality (0–59 yrs).

DISCUSSION

The results presented in this chapter have identified a number of priority-areas for food security assessment in the context of HIV and AIDS, which will guide the analyses presented in the results chapters to follow. These key findings are highlighted thematically in the sections which follow.

Moving beyond wealth indicators?

Firstly, the empirical analyses conducted in this chapter suggested that sole reliance on household wealth-indicators may constitute an ineffective strategy for targeting the food insecure in the study sites. Although household wealth-indicators were on the whole associated with a better household food security status, for households in specific sites and registering specific HIV and AIDS proxies (such as chronic illness and orphan-fostering), households reported a higher experience of food insecurity than we would anticipate from an evaluation of their wealth status alone. If this observation is validated, it has obvious implications for future food-security targeting and monitoring in South Africa, as household socio-economics are widely considered one of the gold bar standards for adequate food access at the household-level (Ferguson *et al.* 1993; Hoddinott and Yohannes 2002), and household economy zones are commonly used as a basis for food-security monitoring and targeting at the national and regional levels (Seaman 2001; O'Donnell 2004).

However, this finding does comes with several reservations. For one, it is in direct contrast to recent research by Twine and Hunter (2008), who, unlike this study, found that households afflicted with HIV-attributable mortality also had significantly lower socio-economic status, which more adequately accounted for the heightened food insecurity seen in these households. Twine and Hunter (2008) concluded, therefore, by advising that HIV and AIDS-status should not be used as a targeting criterion for food security without adequate consideration of overall socio-economic factors. In the current study, however, HIV and AIDS was not significantly associated with household socio-economic status, which effectively invalidated the potential of socio-economic status to explain the "AIDS effect" on household food security. This finding is certainly counter-intuitive. Wealthier individuals generally do better than poorer ones on most measures of health status, and it is thus reasonable to expect that household poverty-levels would be higher in households afflicted with HIV and AIDS (Bollinger and Stover 1999; Barnett and Whiteside 2002; Bachmann and Booysen 2003; Booysen 2003; Bachmann and Booysen 2004; Bell *et al.* 2006). However, more recent research has suggested that relationship between HIV and AIDS and household wealth is not necessarily always a negative one, as it is the wealthy, being more mobile, may be more prone to HIV and AIDS (Shelton *et al.* 2005). Similarly, in a recent analysis of DHS data from eight sub-Saharan countries, Mishra *et al.* (2007a; 2007b) found that, contrary to evidence for other infectious diseases and theoretical expectations, in all eight countries wealthier men and women tended to have higher prevalence of HIV than poorer ones. If future research continues to support this perspective, it may be useful not to validate or invalidate the use of wealth status to indicate food security status of a

household *per se*, but rather indicate that at times this relationship may alter due to external impacts, for example, as in this instance, HIV and AIDS.

Higher experience of food insecurity (but is this indicator to be trusted?)

Secondly, it was suggested in this chapter that the heightened CSI scores in HIV and AIDS-afflicted households may be attributable to insufficient food quantity. This was indicated not only by a tendency for most of the variance in the CSI to be explained in terms of items relating to food quantity restriction, but also by the fact that households with high CSI scores in the presence of HIV and AIDS proxies did not show a similar trend towards lower HDDS, in other words, even though the CSI and the HDDS show good agreement in correlation and regression analyses, they do not identify the same groups as food insecure. HDDS tended to identify low-income groups as food insecure, whereas the CSI identified both low-income groups, those with large household sizes, and households afflicted with HIV and AIDS proxies, as food insecure.

However, before we can reach the conclusion that these heightened CSI scores can be attributed to insufficient food quantity in HIV and AIDS-proxy households, it is necessary to first evaluate the validity of the CSI as an indicator of food quantity insecurity. Although, as reviewed in the introduction, experiential indicators are widely applied in a range of developing contexts, it is also important to note that these indicators also have number of limitations. For example, a recent analysis of four sets of household surveys from Nepal, Indonesia, Albania and Madagascar, Migotto *et al.* (2005) also found that "subjective" and "objective" indicators did not classify the same households as food (in)secure. Using correlation coefficients, two-by-two contingency tables and regressions, the authors concluded that, overall, calorie consumption, dietary diversity and anthropometry were at best weakly correlated to subjective perceptions of food consumption. Similarly, in an evaluation of experiential indicators in Bangladesh, Coates *et al.* (2006) found a particularly low correlation of the experiential indicator with calorie consumption. In conclusion, Migotto *et al.* (2005, p.16) suggest that "while the relative imprecision of these crude experiential indices tested in this study may be sufficient for academic studies, when it comes to targeting food security interventions this imprecision translates into missing food insecure households." The report goes on to caution that "the subjective modules…are not very useful for measuring food insecurity. While subjective food adequacy indicators may provide insight on the vulnerability dimension of food insecurity, [the index] is a too blunt and ambiguous an indicator for directly mapping of food insecurity."

There are also indications that experiential measures might be merely reflecting so-called "attitudinal characteristics" of households. Interestingly, Migotto *et al.* (2005) noted that for Madagascar, households that are poorer compared to their neighbours (relative deprivation)—holding household and community level wealth constant—have a lower perception of food adequacy. Moreover, if the household's economic situation has worsened in the past—holding wealth constant—the household is much more likely to have a lower perception as well. These two results together suggest that the food adequacy questions may be capturing relative food adequacy, in comparison with neighbours, and respondent's perception of changing status over time. As such, they would reveal perceptions of vulnerability and would denote something quite different from standard quantitative measures. As it seems quite natural that HIV and AIDS would tend to accelerate a household's perception of vulnerability, this suggestion has particular relevance to the application of experiential indicators in areas heavily afflicted by HIV and AIDS.

Since the work by Migotto *et al.* (2005), subsequent studies by Frongillo and Nanama (2006) have submitted the experiential measure to repeat analysis using five waves of repeat assessments in Burkina Faso. Due to the highly seasonal nature of food supply in Burkina Faso, they found great variation in the degree of correlation of the experiential measure they used, with quantitative food security benchmarks. However, Frongillo and Nanama (2006) also found that although the experiential measure correlated well with overall assets owned (ranging between -0.34 and -0.44), and well with the amount of food in storage (-0.24 and -0.51), the index was poorly related to actual current household caloric consumption (-0.05 to -0.24). These findings are in keeping with the theory that experiential measures are a good reflection of the sensitivity of a household to their sense of future vulnerability, as reflected by the good correlation between experiential measures and household asset and food stores (Ferguson *et al.* 1993; Maxwell *et al*. 1999; Hatloy *et al.* 2000).

Notwithstanding these important considerations, it should be noted in defence of the CSI, that the correlation coefficients reported for the CSI in this study with the HDDS were far stronger than what has been reported in other comparative studies. For example, Frongillo and Nanama (2006) reported correlation coefficients that ranged from -0.06 to -0.28: which was far weaker than the correlation coefficient of - 0.49 found in this study. Moreover, in their empirical analysis Migotto *et al.* (2005) used the apparently weak correlation between dietary diversity and experiential measures as one of their primary benchmarks for declaring experiential indicators "crude" and "imprecise". Moreover, the association between CSI and household size is consistent with the interpretation of the CSI as being an indicator of food quantity

security, as household size is generally understood to be a good correlate of caloric adequacy (Chung *et al.* 1997; Ruel 2003).

In summary, there is in this study a relatively good empirical basis to suggest that the CSI may indeed be a reliable indicator of actual quantity of food taken in by the household, as indicated by the principle component analysis, the good correlation coefficients for the CSI and HDDS, and the strong relationship between CSI and household size. However, in the absence of an alternate quantitative benchmark to the HDDS against which the validity of the CSI may be triangulated, it is not possible to say this with certainty. It is also not possible in this study to employ the longitudinal analyses that would be needed to control for fixed individual effects and thus determine whether food experiential food insecurity perceptions are indeed determined by the "attitudinal" dimensions of vulnerability. Such endeavours are certainly beyond the scope of the current study, but nonetheless should be recognized as a priority area for future research. At the very least, these issues need to be addressed before the CSI is implemented *en masse* in South African FIVIMS efforts.

Although this study can offer no alternate, quantitative means against which the experiential indicator can be verified, there are other means through which the nature of the relationship between HIV and AIDS and the experiential index of food insecurity can be empirically investigated. It is arguable that qualitative analysis which explores what it means to be "food insecure" in the context of HIV and AIDS, provides a means for assessing the extent to which the heightened food insecurity can be attributed to the so-called "attitudinal" dimensions of vulnerability.

In the chapters that follow, qualitative data will be drawn upon in order to illustrate the manner in which households are experiencing and reacting to food insecurity in the presence of HIV and AIDS. This theme is fluid through out this thesis, and is returned to specifically in the final chapter.

Usefulness of dietary diversity, and food-group targeting

Finally, this chapter made important inroads towards addressing how dietary diversity performs as an indicator of overall food security, compared to individual food types. Generally, it is suggested that overall intake of groups is a better indicator, although in certain contexts, individual food groups might be particularly indicative of the food-security status of a household (Chung *et al.* 1997b). This study initially operated under the hypothesis that intake of individual food groups might alter under HIV and AIDS situations but failed to find

conclusive evidence to support this suggestion. This finding has particular relevance in light of a series of FAO studies from Namibia, Uganda and Zambia, which suggested that decreased meat consumption was evident in HIV and AIDS afflicted households and that this food group could be useful in identifying the food insecure (FAO 2003b; FAO 2003c; FAO 2003d). In the absence of comparative studies for the South African context, these kinds of findings are often used to substantiate general statements as to how we can anticipate the "HIV and AIDS effect" on food security to manifest in the South African context, and what policy responses should be planned. While this finding may certainly be valid in Namibia, Uganda and Zambia, it may be that the situation in South Africa is tempered somewhat by the access of most households to regular welfare grant remittances, which are primarily used for the purchasing of food-stuffs such as meat. Secondly, as the frequency of many high-quality foodstuffs such as meat is low generally, it is difficult to detect changes.

While there is no evidence to suggest that overall food-group intake differs for HIV and AIDS afflicted and non-afflicted households, this chapter did not address whether the food acquisition strategies used in acquiring these food-groups differ with the HIV and AIDS-affliction level of the household. As suggested in Chapter 1, food acquisition strategies in rural areas typically draw on a range of livelihood capitals, which include social capital resources (i.e. donated foods, food acquired through social leverage) and natural capital resources (wild and cultivated foods) which are realised through the employment of household physical (human labour) and human capital (skills and local knowledge). Thus, while we might say with reasonable confidence that the average number of food-groups consumed in afflicted and non-afflicted household do not differ significantly in the study sites, it may still be that the livelihood capitals drawn-upon by households to acquire these food-groups vary with the level of HIV and AIDS affliction in the household. In order to explore this issue empirically, the HDDS needs to be further disaggregated, not just by food group, but also by the different food-acquisition strategies for that food group. Moreover, the CSI needs to be further broken-down into its component "coping strategies" in order to probe how (if at all) the food security responses of households are being shaped by HIV and AIDS. These types of analyses are conducted systematically in the results chapters that follow, each of which deals with the employment of a specific livelihood capital in household food-acquisition.

Chapter 4. The Relationship between Household HIV and AIDS Status and Household Subsistence Agriculture

INTRODUCTION

In Chapter 3, we saw that although proxy HIV and AIDS-afflicted households consumed on average the same number of food groups over a given period (HDDS) as afflicted households, in roughly the same proportions, these households still reported a higher experience of food insecurity. Although this may be attributable to the so-called "attitudinal" aspects of food insecurity, where those afflicted with misfortune have a heightened sense of deprivation relative to their neighbours, it could also be that, rather than restricting the number of food groups consumed, these food insecure households are restricting the quantity of food consumed within each food group. In addition, afflicted households may have altered their acquisition strategies for certain food groups. Both of these explanations would account for why the HDDS, which in Chapter 4 was not disaggregated by food-group acquisition strategy or weighted with a measure of the quantity consumed in each food group, failed to record significant differences between afflicted and non-afflicted households.

This chapter considers the importance of foods sourced through subsistence agricultural activities to household dietary diversity and household food security. This is done through quantitative analysis of the HDDS survey instrument which has been disaggregated not only by food group but also by food source. The extent to which home-cultivated foods are incorporated into the household's diet over time is also used to proxy the degree to which households access, invest in and derive benefits from household labour. These data, in combination with the information derived from the survey addendums relating to household labour and agricultural activities, provides a means through which the association between household labour, food security and HIV and AIDS status can be explored.

Anticipating the impact of HIV and AIDS on household subsistence activities

The impact of HIV and AIDS on household food production is typically described in terms of a series of labour-based responses, which usually centre on efforts to adjust to changes in household labour availability through curtailing or otherwise modifying household agricultural practice. This may involve (1) the reduction of area cultivated and/or (2) the substitution of

crops or changes in crop production, and (3) efforts to replace lost labour through intra-household labour reallocation. Our current understanding of, and evidence in support of these three labour-based response strategies are reviewed in the sections that follow.

Reduction of area cultivated

Reduction in the size of land cultivated was one of the first household responses to HIV and AIDS-induced labour shortages noted in early studies from eastern Africa (Abel *et al.* 1988; Gillespie 1989; Barnett and Blaikie 1992; FAO 1995), and it is also one of the most commonly-cited responses in discourse from the southern African region.

In Zimbabwe, a SADC VAC study that randomly surveyed households in 57 districts found that the presence of prime adults in the household almost doubled the likelihood that a household would indicate it planned to plant more crops, or increased the area under cultivation (SADC FANR VAC 2003). In Zambia the 2001–2002 VAC surveyed households in 24 districts, and found evidence that households with prime adult chronic illness were experiencing even greater drought-associated curtailing of area under cultivation. Specifically, households without a chronically ill prime adult household-head were on average planting a 22 % greater area than the previous year, while households with a chronically ill household-head had planted 53 % less area (SADC FANR VAC 2003). In Swaziland, an FAO-VAC study conducted in 2003 found that the reduction of area under cultivation from one season to the next was 8 % for households without recent mortality (any age group), versus 39 % for households with recent mortality (FAO VAC 2004).

Although these findings are suggestive, it is important to note that many of these studies were conducted during periods of seasonal crop-failure, when most households (regardless of their HIV and AIDS-affliction status) had experienced a reduction in plot-size. It is also unfortunate that some studies, such as the Swaziland VAC, only looked at mortality generally and did not focus specifically on prime adult death. Having said that, there is, however, evidence from other sources that suggests an independent effect of HIV and AIDS-associated mortality on household plot-size. In a study of 417 rural subsistence agriculture households conducted by Muwanga (2002), the researchers specifically examined the effect of AIDS-attributable death (as determined by verbal autopsies) on size of land cultivated. Muwanga (2002) reported that 38.5 % of households with AIDS-mortality reported a statistically significant reduction in the

size of land cultivated compared to 18 % in households with a non-AIDS-mortality and only 7.8 % for households with no death.

Recent evidence from the FANRPAN seven-country case studies offers some support for these findings. In Zimbabwe, the FANRPAN study reported that 68 % of "afflicted" (mortality and/or morbidity) households were cropping less than 50 % of their land, compared to 60 % of non-afflicted households. In Botswana, households with chronic illness reported cultivating a mean area of 10 hectares compared to 4 hectares after illness; in South Africa, cultivated area was 33 % lower in households with chronic illness and 37 % smaller following prime adult (PA) mortality (FANRPAN 2007). The FANRPAN report also noted that the Lebombo district of Swaziland has in recent years experienced a 44 % decline in maize production, which may be at least partly attributable to HIV and AIDS.

It should be noted, however, that the FANRPAN report did not state whether reported differences were statistically significant or not. It is also noteworthy that at the time of research, a number of the areas in question had recently experienced severe drought, which had undoubtedly heightened the intensity of household responses. In Swaziland, the report noted that the sharp decline in area devoted to maize may also be countered somewhat by an overall increased production of beans, which might be the result of the interventions of an aid organization in the area who had promoted beans as a more labour-efficient alternative to maize. It is also interesting that none of the households in the seven-country studies reported agronomic reasons for leaving lands fallow or reducing land-size. Economic constraints and lack of draught-power were far more likely to be cited. However, as HIV and AIDS has also been tied to the sale of livestock and assets (Baier 1997; Drimie 2002; Mphale *et al.* 2002), these effects could still be attributable to HIV and AIDS.

In contrast to these cross-sectional, agency-led research projects, Yamano and Jayne (2004) analysed two-year panel data of 1,422 Kenyan households surveyed in 1997 and 2000 in order to measure how working-age adult mortality affects rural households' agricultural activities over time. Contrary to expectations, the results of these longitudinal analyses contradicted the findings of the aid-agency reports. Regression analyses showed that death of a working-age adult was not significantly associated with a reduction in the total cropped area over time. However, the authors did note that when adult mortality was disaggregated by gender and cultivated land was disaggregated into three crop categories (cereals, root crops, and high-value crops), there was a difference in the change in area devoted to high-value crops. Specifically, among households without any working-age adult death, the area devoted to high-value crops between 1997 and 2000 significantly increased. Yet among households incurring a working-age

male death, the area devoted to high-value crops (a primarily male activity) showed a much smaller increment. Importantly, the authors pointed out that the results shown were not attributable to labour shortage *per se*, but rather the loss of the man's land-title, which serves as a pre-condition to participation in out-grower schemes.

Subsequent longitudinal analysis by Jayne *et al.* (2006) of households from nearly 400 communities in Zambia has further suggested that if HIV and AIDS is associated with declines in the size of area cultivated over time, the effect is subtle, marginal, and not necessarily evident at the household-level. Rather, community-level effects may be more useful to analyse; Jayne *et al.* (2006) found that a 25 % increase in prime age mortality resulted in a 5 % (statistically significant) decline in area under cultivation at a community level, over four years.

Substitution of crops and changes in crop production

Another agricultural response to prime-adult death suggested in the literature is that affected households tend to shift toward less labour-intensive crops, such as roots and tubers. This response was initially proposed in theoretical discourse from the 1980s (Abel *et al.* 1988; Gillespie 1989). Early studies found some evidence to support this theory (Barnett *et al.* 1995), and since then this household response has become one of the most commonly cited household agricultural responses in synthesis reports (FAO 1995; Mutangadura *et al.* 1999; Drimie and Gandure 2005). It has also been reported that labour shortages and loss of agricultural knowledge may force HIV and AIDS-afflicted families to reduce the range of crops under cultivation. Some researchers have even identified a shift in households' preference for early maturing crops to late maturing ones, with fewer types of crops increasingly being preferred (Ncube 1998). Although the literature has conventionally viewed shifts in cropping pattern in terms of changes in the choices a household makes as to what to cultivate, a number of commentaries by Barany *et al.* (2001; 2004; 2005) have suggested that households may also start entertaining the option to shift to wild (or otherwise uncultivated) foods, due to the comparatively lower labour demands levied by this "crop" (see Chapter 5).

Yet while HIV and AIDS-related illness and death may be causing shifts in household cropping and harvesting, Jayne *et al.* (2005) caution that it is important to acknowledge that recent crop and input policy-changes in many eastern and southern African countries have affected the relative output/input price ratios for grain crops relative to roots and tubers, reducing the profitability in some areas of grains as compared to roots and tubers. Moreover, in cases where

significant shifts in cropping pattern are apparent, it is important to realize that this may not be attributable to labour loss *per se*. For example, in an analysis conducted by Donovan *et al.* (2005) on data from Rwanda, the researchers found a significant decrease in coffee, beer and banana production among households with a prime adult death, and a significant increase in production of sweet potatoes among households with a chronically-ill prime adult. The authors note, however, that the reduction in cash-crop production may be due to loss of male adults and their connections with coffee brokers, rather than labour loss.

Indeed, when the evidence is assessed, there have been few recent empirical gains to corroborate the hypothesis that HIV and AIDS is associated with shifts to less labour-intensive crops. For example, while Muwanga (2002) reports that in Swaziland 43 % of the households that experienced an HIV and AIDS death substituted labour-intensive crops like cotton with less labour-intensive crops like maize, this finding was in keeping with overall country-wide trends in cropping patterns, and the change in crop-pattern was not statistically significant for afflicted households. In another example, the FANRPAN (2007, p.64) report echoed the consensual view in their synthesis when the authors claimed that, "There is a tendency for HIV and AIDS affected households to grow less labour-intensive food crops compared to cash crops" and that "crop diversification is reduced in the presence of HIV and AIDS because of the household's incapacity to cultivate larger pieces of land, labour morbidity and mono-cultural tendencies in such households". However, the report did not cite any specific evidence for changes in crop composition following HIV and AIDS, although it was noted in focus group discussions that some informants were considering changing from maize to sorghum due to less demand on inputs. No evidence was given that this was a specifically HIV and AIDS-related response.

Analysis of cross-sectional and longitudinal panel data from a number of African countries has also failed to find conclusive evidence supporting the theory that HIV and AIDS is associated with changes in cropping pattern. Using panel data from Mozambique, Rwanda, and Zambia, Mather *et al.* (2005) compared the percentage of area cultivated to roots and tubers among prime-adult mortality-affected and non-affected households. As the data in question was cross-sectional in nature, the authors could not infer from mean results alone whether or not affected household cropping had changed over time, but the results did demonstrate that the cultivation of roots and tubers was not on average higher among affected households. Similar findings have been reported from other sources. For example, Beegle (2005) found that although some farm activities were temporarily scaled-back after a male death and wage income fell, affected households did not shift toward subsistence crops.

Intra and Inter-household labour reallocation and the use of child labour

The recall of household members from urban to rural areas to replace lost household labour and the re-allocation of existing household labour to fill deficits are very commonly cited household response strategies to HIV and AIDS. Studies from Tanzania and Uganda show that afflicted households tend to at least partially compensate for the death of a family member by bringing back to the farm another member residing off the farm, which means that in the long-term, there is little or no impact on labour devoted to agricultural activities (Menon *et al.* 1998; Beegle 2005). In Kenya, Yamano and Jayne (2004) found that the relationship of the deceased to the household plays an important role in determining the extent to which labour can be replaced. Households suffering the death of a household head or spouse were largely unable to replace the labour lost through the death, whereas households suffering the death of another adult were able to attract new household members. Similarly, in their analysis of panel data from Malawi, Mozambique, Kenya, Rwanda and Zambia; Mather *et al.* (2005) found that while median area cultivated was somewhat lower among affected households as compared with non-affected households for all countries except Zambia, area cultivated per capita was similar to that of non-affected households. These results suggested that land/labour ratios of many affected households are similar to those of non-affected households and imply that agricultural labour may not be the household's principal production constraint.

While inter and intra-household reallocation of household labour may at least partially stabilize the supply of family labour for agriculture, it may imply serious trade-offs for household financial and human capital. Recall of relatives may mean that off-farm and remittance incomes are reduced, which would in time exacerbate capital constraints on agriculture. The recall of children from school and the allocation of minors to household agricultural duties is another serious repercussion of balancing household labour deficits. Ironically, early analyses by Gillespie (1989) had predicted that HIV and AIDS might result in a shortage of available child-labour due to declining population growth rates and infant mortality. However, there is now mounting evidence that the actual impacts of HIV and AIDS are more to the contrary. For example, in a case study from Bukoba district, Tanzania, Rugalema (1999) found that illness placed pressure on children to work and was associated with a heightened reliance on child labour for household chores. In a case study in Zambia, an average of between 3 and 9 % of children reported recently having to drop out of school in order to replace lost household labour (FAO 2003d). Case studies from Namibia (FAO 2003b) and Uganda (FAO 2003c) reported similar results, although for these latter studies the extent of the phenomenon was not quantified.

The increased need for child labour appears to be more common in poor households, where the removal of children from school is also used as a way of reducing household education expenses (Muwanga 2002). In recent years, these cross-sectional studies have been given considerable impetus by the analysis of panel data from Tanzania (Beegle *et al.* 2006), which found that transitory agricultural shocks (measured by accidental crop-failure) lead to increases in child labour. There has been further evidence that child labour is specifically used as a buffer or form of alternate insurance, as household asset holdings appeared to decrease the odds of child-labour being employed. In Kenya, Yamano and Jayne (2004) confirmed that children in relatively poor households were more likely to drop out of school after the death of an adult member than children in less poor households.

Research aims

HIV and AIDS is argued to trigger household labour shortages, which may cause a decline in household subsistence agricultural production. This may have important implications in terms of household food security, and the quantity and quality of inputs of cultivated foods into the household diet. However, changes in land-use, crop-choice and intra-household labour allocation may ameliorate this effect.

As the review in the preceding section illustrates, it is difficult to deduce how this effect will play out in the South African context, as most of our current understanding as to the impact of HIV and AIDS on household labour is based on studies conducted outside of South Africa and even these studies show little evidence of a consensual view. Given these considerations, this study aimed to explore how proxy indicators of household HIV and AIDS (such as presence of PA mortality, morbidity and the fostering of orphans in the household) are associated with the following:

Incidence of child labour in the household, the size of land cultivated, the diversity of crops planted, and the quantity and diversity of home-cultivated crops incorporated into the household diet over a 12-month monitoring period.

METHODS

Study sites

Sites were the Mt. Frere region in the Eastern Cape, and the KwaDlangezwa and Nkandla settlements in KwaZulu-Natal. See Chapter 3 for full site descriptions.

Households sampled

Households were selected according to the presence of household HIV and AIDS proxies, using the sampling procedures described in Chapter 2. After data cleaning food security and dietary recall information were derived for a total of 307 households (see Chapter 2). However, twenty-five of these households did not engage in any household subsistence agricultural activities. As a result, for some of the sections relating to crop-choice and cultivation practices, the final sample-size was reduced to 280 households comprising 97 households in Mt. Frere, 92 households in Nkandla and 91 households in KwaDlangezwa. It should be noted, however, that although the sample-size may vary for different models run in analyses, the sample-sizes are drawn from the same data-set of households.

Food security and dietary intake information

Data on household food security status and the proportion of food groups derived from intake of domestically cultivated foods over time were derived from repeat assessments over a 12-month period. See Chapter 2 and Chapter 3 for a full description of these indicators, and sampling procedures associated with them.

Household labour addendum

A quantitative survey addendum was collected in each household in the third wave of assessments (see Chapter 3 and the addendum). From this survey addendum, the following indicators were derived:

Measure of household labour score

For every individual residing in the household, the frequency with which they engaged in gardening activities was recorded on a scale from 1 to 6, where 1=yearly, 2=monthly, 3=every few weeks, 4=weekly, 5=every few days, 6=daily. An agricultural Household Labour Score (HLS) was then derived for each household by multiplying the number of people who engage in

agricultural work in the household by the mean frequency response category (1–6) for all actively cultivating household members.

Plot size

As most informants did not know the size of the land under cultivation, initially we tried to acquire direct measurements of the size of land actively been worked by the household. However, this approach proved unsuccessful. Besides being a somewhat intrusive method, it was often difficult to make a judgement call as to whether a plot should be classed as "actively cultivated" or not. Frequently, land was in a state of semi-cultivation; weeds were mixed with crops, or small patches within a single plot were more intensively farmed than others. Deciding on whether to measure the entire plot or just "active" portions therein was thus difficult. Plots were also often fragmented, either being dispersed in patches around the homestead or isolated far from the home. At times, we would start measuring a plot, only to discover that portions of the land were being utilized by neighbours or relatives not part of the homestead. Finally, plots varied widely in size, from smaller home-gardens in KwaDlangezwa to more sizable fields in Mt. Frere and Nkandla. Physical measuring of these plots would therefore be considerably challenging in some regions. Given these observations, the idea of reliably attaining direct plot-size measurements was abandoned in favour of a simple user-rated ranking of plot-size, where households were simply asked to rate whether the size of the area they had cultivated last season was larger, the same as, or smaller than "most people".

Diversity of crops planted

All crop-types planted by the household in the preceding planting season (irrespective of whether the crop succeeded or not) were recorded, as well as crop-types planted in the current season. In preliminary analyses, tests of association were run on presence or absence of a crop-type in the household's planting regime with household HIV and AIDS, socio-economic and demographic variables. But this analysis failed to reveal consistent or clear trends. Data were then aggregated into simple categorical indices for low, intermediate and high numbers of crops planted, as well as a continuous variable for total number of crops planted.

Incorporation of crops into household diet

As simply planting a high diversity of crops does not necessarily mean a high quantity and diversity of crops will eventually be incorporated into the household diet, at each assessment the person responsible for preparing the household meals was asked to report all foods eaten by the

household in the preceding 48 hrs. The type of food eaten, as well as whether the food was harvested from a domestic garden, was then recorded. For the purpose of analysis, a binary variable was constructed to reflect the incidence of one or more cultivated food type(s) in the household's dietary recall over the annual monitoring period. The number of different types of cultivated foods accrued over the monitoring period was also summed in order to get an index of the diversity of cultivated foods eaten, which were then categorized into low, intermediate or high diversity. The percentage contribution of cultivated foods to the total number of food types consumed by the household over the year was also calculated.

DATA ANALYSIS

Continuous data were checked for normality of distribution and where possible transformed. For data that could not be transformed to normality, non-parametric methods were used when medians had to be compared. All data presented in results tables and graphs are means and standard deviations for untransformed data.

Data were analysed by means of a series of logistic regression models that explore the specific questions laid out in research aims 1–3 (preceding section). Regressions were executed in Minitab 15. Logistic regressions were chosen as the best means of analysis primarily because this method allows for the step-wise analysis of complex, multivariate data which is characterized by a broad range of data distributions and types: from non-normal continuous variables, to dichotomous categorical variables, to normal and log-normal continuous data. Logistic regressions also allowed for the richness of the cumulative migration scores, income scores, HIV and AIDS and health proxy scores collected in this study to be exploited. As these data sources all showed strong left-skews that could not be transformed to normality, if these cumulative scores were to be incorporated into analysis (and not merely collapsed into simple presence/absence data), a method of analysis was required that was robust to this form of skewed distribution. Binary and ordinal logistic regressions were also deemed suitable because outcomes indicators were also mostly categorical in nature, such as presence or absence of child labour, presence or absence of a cultivated food, a certain level of plot-size or crop diversity, and so on. Finally, by including site as a categorical variable in analyses, it was possible to conduct analysis on the pooled data-set. In all the analysis presented in the result sections that follow, site was included as a control variable.

RESULTS

Household labour composition

Most of the people engaging in agricultural activities were female, and 31 % were male (Figure 4.1a). This figure was highest in Nkandla, where almost half (47 %) of all household labourers were male.

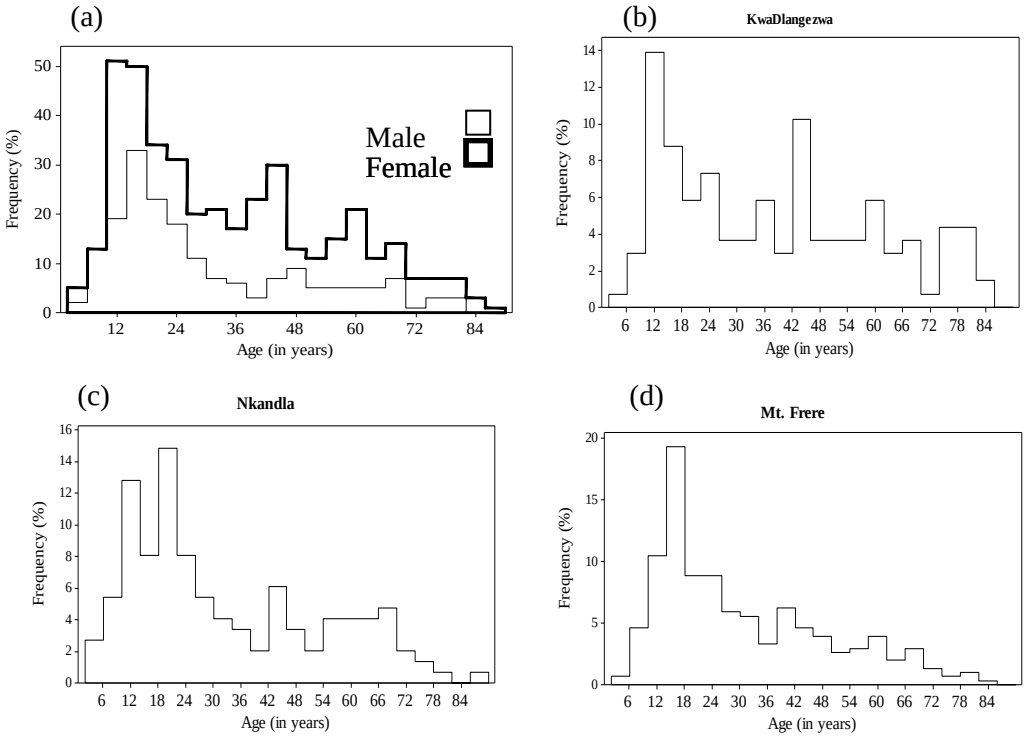


Figure 4.1. (a) Age and gender distribution of household members engaging in domestic agricultural activities, pooled across sites (N=589); (b) Age class distribution of household labourers in KwaDlangezwa (n=166); (c) Nkandla (n=188) and (d) Mt. Frere (n=313).

In all sites children between the ages of 12–14 make up the largest proportion of household "labourers" (Figures 4.1a–d). In KwaDlangezwa, over 20 % of all household labourers were 18 or under, and in Mt. Frere the figure was nearly 40 %. Overall, 46 % of the households with household members actively (that is, within the last year) cultivating at the time of assessment employed labour of a child aged 5–16.

Children not only worked with high incidence, by also high regularity. Despite their youth, the frequency with which children reportedly engaged in cultivation activities was only marginally smaller than mean adult labouring frequencies (Figure 4.2).

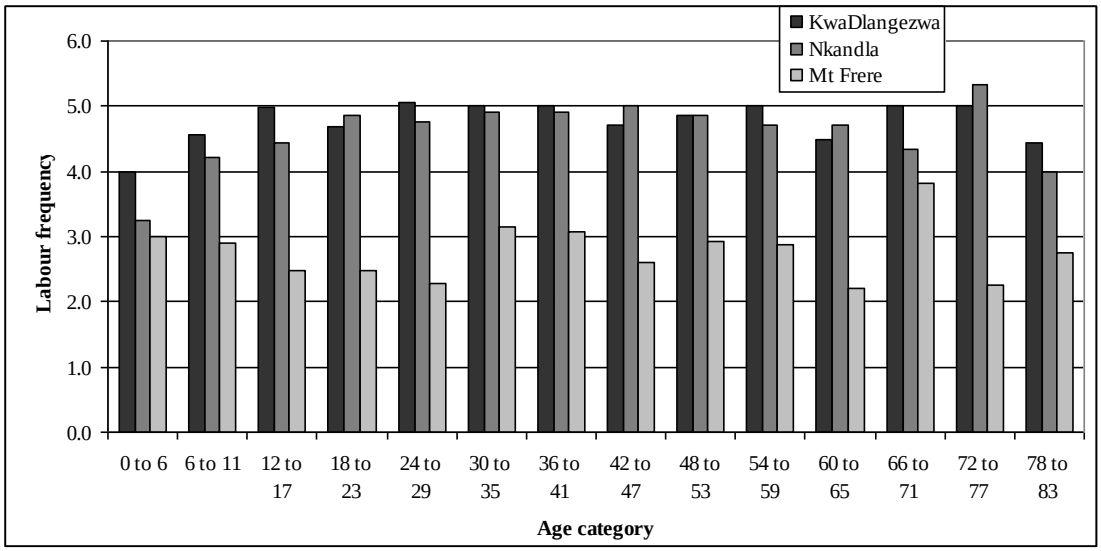


Figure 4.2. Mean labouring frequency response category for various age-classes, disaggregated by site.

Incidence of households with gardens that were being actively cultivated in the current growing season was highest in Mt. Frere (n=92), followed by KwaDlangezwa (n=67) and Nkandla (n=56). Incidence in Nkandla was especially low during the year of study, due to a severe drought (see Chapter 2, site descriptions). Mt. Frere also had a much higher percentage of household members participating in gardening (85 %), compared to just 33 % in KwaDlangezwa and 39 % in Nkandla.

However, despite (or perhaps because of) a high number of individuals relative to household size engaging in cultivation in Mt. Frere, the regularity with which these household members carried out their duties was far smaller in Mt. Frere. On average, agriculturally active household members in Mt. Frere worked in the garden once every few weeks (mean 2.8 ± 1.6), whereas individuals from Nkandla (4.6 ±1.1) and KwaDlangezwa (4.8 ±0.7) on average reported frequencies of at least once a week. As a result, mean household labour scores were relatively similar for KwaDlangezwa (7.3 ± 7.2), Nkandla (7.4 ±9.8) and Mt. Frere (8.5 ±6.0).

Household labour score was significantly positively associated with the "potential labour pool" of the household, as indicated by the number of people aged 5 and over in the household. For every additional person in this age category in the household, the odds of being in a higher terciles of low, medium or high labour scores increased by 9 % (p=0.016, OR=0.91 [CI=0.85-0.98]). Interestingly, prime adult (PA) age groups were not significant with labour score, which is not too surprising given the importance of child labour in the study sites.

Employment of child labour

Mean household labour scores were not statistically different for afflicted households versus unafflicted households in any of the three sites. This suggests that either HIV and AIDS has no detectable effect on household labour, or that the effect is being ameliorated to some extent by coping strategies that have been implemented to equalize household labour deficits in proxy-afflicted households. HIV and AIDS theory suggests that one such coping strategy is the substitution of child labour following morbidity or mortality of a PA. In order to test this hypothesis, binary logistic regressions were used to explore whether, after adjusting for relevant covariates, the likelihood of a household employing child labour was associated with household HIV and AIDS proxies. In other words, do higher household-levels of HIV and AIDS proxies increase the odds of a household using the labour of one or more children for subsistence cultivation?

A series of binary logistic regressions were run in order to explore which factors are significantly associated with the log-likelihood of a household employing child labour. For the independent variable, household child labour incidence in the 5–18 yr and 5-16 yr age categories were tested alternatively for all relevant analyses, but the 5-18 yr category was later dropped in favour of the 5–16 year demographic due to its relatively small statistical significance. Starting with a base main-effects model that adjusted only for site, individual socio-economic, demographic and AIDS proxy variables were tested for significant associations with the likelihood of a household employing child labour (see Addendum a, Tables a1 and a2). The results of these analyses showed that having a higher number of non-working individuals (dependents) in the household (p=0.017, OR=1.18 [1.03-1.34]) independently increased the odds of a household employing child labour, whereas higher household income: person ratios independently decreased these odds (p= 0.040, OR=0.84 [0.74-0.96]). The ratio of children: adults was also significant with likelihood of employing child labour, and for every additional child per adult in the household, the odds of employing child labour increased by 124 %

[p<0.001, OR=2.24 [1.55-3.25]). Lastly, female-headed households were 81 % more likely to have child labour [p=0.040, OR=1.81 [1.03-3.19]).

With respects to main HIV and AIDS effects, the presence of maternal and paternal orphans with child support grants significantly increased the odds of a household employing child labour (p=0.025, OR=1.87 [1.08-3.24]; p=0.029, OR=1.50 [1.04-2.17]; for maternal and paternal orphans, respectively). Alternatively, the presence of single-parent orphans not receiving child support grants failed to have a similar effect on child-labour likelihood, suggesting that child-support grants are important sources of seed-funds for planting and maintaining household food gardens. No other HIV and AIDS proxies registered as significant as main effects (Addendum a, Table a2).

Next, more complex models were run which explored the significance of HIV and AIDS proxies on the odds of employing child labour, when adjusting for both site and significant socio-economic and demographic covariates. In order to avoid potentially confounding effects of multicollinearity between independent variables, HIV and AIDS proxies were initially screened for significant correlation coefficients. Significantly correlated variables were then regressed, and Variance Inflation Factors (VIFs) examined. Significantly correlated variables with VIFs>4.0 were not included simultaneously as covariates in logistic regressions.

In initial analyses, simple main-effects models run on individual HIV and AIDS proxies showed that paternal and maternal-orphan fostering (with child-support grants) was associated with significantly higher odds of employing child labour. However, after adjusting for significant socio-economic and demographic covariates, only female-headedness maintained its significance as a main effect in the mixed model. This suggests that while single-parent orphanhood and household socio-economic and demographic ratios may appear to be associated with higher odds of employing child-labour, these factors are subsidiary to female-headedness in affecting the odds of a household employing child-labour.

Yet while the HIV and AIDS proxy of single-parent orphan-fostering fails to maintain significance in mixed models, other HIV and AIDS proxies shower the opposite trend, becoming significant only after adjusting for relevant co-variates. For example, in saturated models which adjusted for site, as well as presence of both female-headedness and child: adult ratios, for every additional person with chronic illness (18-64 yrs) in the household, the odds of a household employing child labour increased significantly by 61 % (p=0.035, AOR=1.61 [1.04-2.51]). However, this effect failed to maintain significance when ratio income: person was also accounted for (p=0.057, AOR =1.54 [0.99-2.41]). This suggests that, for households with

equivalent child: adult ratio and female-headedness status, the addition of chronic illness in the household is likely further to increase odds of that household employing child labour. However, if the (ameliorative) effect of household income is factored in, the importance of household labour is no longer statistically significant.

In a series of alternate analyses, presence/absence of an HIV and AIDS proxy in the household was used as a binary response variable, in order to explore whether household labour score is associated with a household HIV and AIDS proxy outcome. Initially, household labour scores were not significant with any of the HIV and AIDS proxy outcomes. However, when presence of child labour was included in the models, household labour score became significant for households with recent death in the 18–64 yr category (p=0.019, OR=2.49 [CI=1.16-5.31]). This suggests that for households who have recently suffered from the mortality of an adult aged 18–64, there is no detectable relationship with household labour scores (p=0.18, OR=0.97 [CI=0.92-0.12]), unless we account for the employment of child labour in these households. When child labour is factored in, we see that those households with lower labour scores are also more likely to be households with recent 18–64 year mortality.

Size of land cultivated

In order to test the hypothesis that HIV and AIDS is associated with a smaller overall size of land cultivated, ordinal logistic regressions were used to explore whether, after adjusting for relevant covariates, the likelihood of a household rating their garden as non-existent or inactive currently (15 % of positive responses), smaller than others (29 %), the same size as others (53 %), or larger than others (9 %) is affected by total number of individuals registering HIV and AIDS-proxy indicators in the household over the four 3-monthly assessments. In other words, do higher household-levels of HIV and AIDS proxies increase the odds of a household rating their plot in a smaller size category?

Initially, simple main-effect models were run to explore what socio-economic, demographic and HIV and AIDS proxy-variables had an independent affect on plot-size, while controlling for site alone (see addendum a, Table a2 for a full list of variables). The results of these initial analyses showed that having a greater numbers of adults in the household significantly increased the odds of a household rating itself in a lower plot-size category (p=0.023, OR=1.16 [1.02-1.32]. Having a higher number of social welfare grantees in the household, however, decreased the odds of a household rating itself in a lower plot-size category (p=0.008, OR=0.84 [0.74-0.96]).

For HIV and AIDS proxies (Table 4.2), having recent mortality in the 0-59 yr demographic (both with and without CI) significantly increased the odds of a household reporting itself in a lower plot-size category (p=0.027, OR=1.52 [1.07-2.20]; p=0.037, OR=1.52[1.03-2.25]; respectively). Likewise, gender-disaggregated analyses showed that for every additional deceased adult female (18-64 yr) the odds of a household reporting itself in a lower plot-size category more than doubled (p=0.003, OR=2.05 [1.27-3.33]). Finally, having paternal orphans, and specifically paternal orphans without grants, significantly increased the odds of a household reporting a smaller plot-size category (p=0.036, OR=1.28 [1.05-1.55]; p=0.013, OR=1.37 [1.02-1.83]; respectively).

Next, the significance of HIV and AIDS proxies in mixed models which adjusted for significant socio-economic and demographic covariates was explored. In order to avoid multicollinearity, HIV and AIDS proxies that were correlated, and showed IVF >4 were each explored individually in separate analyses. The results of these analyses showed that recent mortality (0-59 yrs) and recent female mortality (18-64 yrs) maintained a significant, independent effect on the odds of a household having a lower plot-size category even when adjusting for the number of remaining household adults and social welfare grants (p=0.031, OR=1.50 [1.04-2.16]; p=0.002, OR=2.13 [1.31-3.48]; respectively). However, after adjusting for the overall household labour score, whereas recent mortality (0-59 yrs) failed to maintain a significant association with plot-size (p=0.061, AOR =1.42 [0.98-2.06]), recent female mortality maintained an independent effect on plot-size (p=0.003, AOR=2.11 [1.29-3.45]). This suggests that given the presence of 0-59 yr mortality in the household, net household labour scores are still the most important factor associated with plot-size category. However, for households specifically with mortality in 18-64 yr (female) demographic, even when holding constant the net household labour score, households with PA female mortality have significantly higher odds of reporting smaller plot-size categories. More detailed analysis which disaggregated PA mortality by relationship to the household head (HHH) showed that mortality of a PA daughter of the HHH was most likely to lower the odds of a high plot-size ratings (p=0.010, OR=2.62 [CI 1.27-5.67]), although mortality of a PA female HHH was approaching statistical significance (p=0.055, OR=1.92 [CI 0.98-5.68]). This finding is consistent with the characterization of the female head-of-household (or spouse) as having primary responsibility for growing the household's food supply.

Finally, the robustness of the association between the number of (paternal and double) orphans was tested in mixed models. The resulting analyses suggested that the number of paternal orphans in the household independently increased the odds of a household reporting a smaller

plot size-class even when adjusting for the number of adults, welfare grantees and overall labour product of the household (p= 0.015, AOR=1.20 [1.04-1.39]).

Diversity of crops planted

The number of crop-types that a household reported planting in the preceding growing season was significantly correlated with household labour score (r=0.40, p<0.01), as was plot size (r=0.29, p<0.01).For the purpose of analysis, crop diversity was categorised into high (more than 4 types of crop), medium (3 or 4 types of crops) and low diversity (1 or 2 types of crops). In simple main-effects models, having more children in the household decreased the odds of a household reporting lower crop diversity (p=0.041, OR=0.88 [CI=0.79-0.99]). As the number of grantees in a household significantly contributed to crop diversity (p=0.026, OR=0.84, [CI=0.73-0.98]), number of welfare grants in the household was introduced as a covariate in mixed demographic models, with the result that number of children ceased to maintain statistical significance. This indicates that it is the influx of additional child welfare grants that accompanies higher number of children in the household, rather than number of children *per* se, that positively affects crop diversity. It is also notable that the other major grant-receiving category, namely state pensioner adults over 64 yrs, did not demonstrate a comparable association with crop diversity. This may be because younger adults are more likely to initiate (and thus fund) agricultural activities.

HIV and AIDS proxies were also tested for significant main effects with crop diversity category. When controlling for site alone, households with higher numbers of chronic illness in both the 0-59 yr and 18-64 yr demographic had lower odds of being classed in a lower crop-diversity category (p=0.019, OR=0.68 [0.49-0.93], p=0.025, OR=0.65 [0.45-0.95]). Households with maternal orphans (without child-support grants) also had a lower likelihood of being in a lower diversity category (p=0.019, OR=0.54 [0.32-0.90]).

Mixed models were then applied which tested for the significance of main-effect HIV and AIDS proxies when adjusting for relevant socio-economic, demographic and also land-use covariates. The results of this analysis show that given equivalent grant, demographic and labour/plot size availability, higher levels of chronic illness in both 0-59 yr and 18-64 yr age-categories significantly decreased the odds of a household falling into a lower category of crop diversity (p=0.008, AOR=0.65 [0.47-0.89]; p=0.015, AOR=0.62 [0.42-0.91]; respectively). Thus, although diversity of crops planted appears to be primarily influenced by the influx of

child-welfare grants, even when holding welfare grants constant, households with chronic illness appear to be investing more heavily in crop diversification. The same, however, did not hold for the number of maternal orphans (without child-support grants) in the household. When adjusting for the size of the plot, overall household labour product and number of children in the household, maternal orphan fostering failed to maintain a significant association with crop diversity (p=0.454).

These findings suggest that household with chronic illness may be investing more heavily in planting a larger diversity of crop types within a given growing season. However, simply planting a diversity of crops does not necessarily mean that more cultivated foods will enter the household diet, as the maintenance period between planting and harvesting requires continued investment of household physical and financial resources. Thus, possibly a more useful question would be to probe whether HIV and AIDS proxies in the household affect the likelihood of cultivated food being harvested, and then actually incorporated into the household diet, over a given time-period. This question is explored in the section that follows, using the information derived from the 48 hr dietary recalls conducted in over the annual assessment period.

Incorporation of cultivated crops into household diet

Binary logistic regressions were used to explore whether the likelihood of a household having a cultivated food in their dietary recall is significantly associated with household HIV and AIDS proxies. In order to explore this question, presence of at least one cultivated food in a household's dietary recalls over four 3-monthly repeat assessments was used as a dichotomous response variable. Wild foods were not included in this definition, as use of wild foods is dealt with separately in Chapter 5. Two-thirds (N=171) of the 284 households under observation fulfilled this requirement.

As might be expected, presence of a cultivated food in the HDDS was associated with household labour score (p=0.012, OR=1.05 [CI=1.01-1.09]), but not with overall household demographics, such as the number of PAs, resident females, number of children (with or without controlling for grant income), and so on (see Addendum a, Table a1). As with crop diversity, higher numbers of grantees in the household significantly increased the odds of having a cultivated food (p=0.023, OR=1.19 [CI=1.02-1.39]) and, for every additional R100 in grant income per household per month, the odds of a household having a cultivated food in their HDDS increased by 9 % (p=0.001, OR=1.09 [CI=1.03-1.11]). Earned monthly income was only

significant with the likelihood of having a cultivated food when overall household monthly income (which included earned and welfare-grant sources) was adjusted for. For households with comparative combined monthly incomes, having a higher proportion of that income derived from wage-work significantly decreased the odds of a household having a cultivated food, and for every additional R100 earned per month, the odds of having a cultivated food decreased by 7 % ($p<0.001$, OR=0.93 [CI=0.89-0.97]).

Individual HIV and AIDS proxies were also tested for significant main effects with the odds of a household having cultivated foods in their dietary recalls after 12 months (see Addendum a, Table a2). Interestingly, whereas chronic illness (0-59 and 18-64 yrs) was not significantly associated with the odds of having a cultivated food in the diet, having greater numbers of individuals with chronic illness accompanied by free treatment increased the odds of having cultivated foods in the diet by 63 % and 65 %, respectively ($p=0.19$, OR=1.63 [1.08-2.47]; $p=0.031$, OR=1.65 [1.05-2.60]; respectively).

The significance of chronic illness with free treatment was further explored in mixed models that adjusted for significant covariates - including total household income, plot-size category, household labour product, the number of people aged 0-64 in the household, and number of overall social welfare grants. The results of this analysis indicated that households with people suffering from chronic illness (0-59 and 18-64 yrs) receiving treatment, were significantly more likely to have cultivated foods in their dietary recalls ($p=0.019$, OR=1.65 [1.08-2.52]; $p=0.035$, AOR=1.66 [1.04-2.66]; respectively). Conversely, chronic illness without free treatment was not significant. When contrasted to the findings in the preceding section on crop diversity, these results suggest that although chronic illness in the household may be associated with a higher diversity of crops planted within a given growing season, only households with chronically-ill household members receiving treatment are more likely to incorporate these products into the household diet.

DISCUSSION

Impact of mortality on agricultural activities

In contrast to the theory that HIV-related mortality is typically most damaging when associated with the death of household heads/spouses, the results of this study indicates that the death of a PA daughter of the household head is most likely to be associated with smaller household plot-

size. These gendered findings are typical of the complexities involved in HIV and AIDS type analysis. HIV and AIDS-affected coping is frequently disaggregated in terms of structured inequalities, and researchers have been cautioned that the true impact of HIV and AIDS may be hidden by aggregate statistical analyses (De Waal and Tumushabe 2003). Similar observations about the importance of a gender-disaggregated approach in HIV and AIDS and household labour studies have been made by Yamano and Jayne (2004) in Kenya, where it was found that the death of a female head/spouse decreased the size of cultivated land devoted to cereals by 1.19 acres over a period of four years.

Household labour-adjustment mechanisms

Whether the use of child labour in domestic agricultural activities constitutes child exploitation is a worthwhile debate, but one that is beyond the scope of this current study. Suffice for it to be said that the likelihood of a household employing child labour was affected by two key factors – both of which are associated with HIV and AIDS. Firstly, higher child: adult dependency ratios in a household strongly increased the odds of a household employing child labour. Through this mechanism, HIV and AIDS may increase the likelihood of child labour by altering household dependency ratios. Secondly, even when adjusting for child: adult ratios, the likelihood of a household employing child labour appears to be influenced by the relationship of adult males to the household. The absence of a male household-head accompanied by mortality (that is, paternal orphanhood) increased the likelihood of child labour.

In the theoretical literature that describes the impacts of adult mortality on agricultural activities, there is a tendency to consider the loss of labour and/or wages formerly provided by deceased PA adults with little consideration of the potential for demographic responses by the household to adjust to this loss. Although affected households may well have suffered negative effects on household crop production and income, on average most affected households in the study sites had similar household labour scores to unaffected households. However, households that had recently suffered the death of an adult aged 18–64 formed a particular subset of affected households which tended to have lower household labour scores relative to unaffected households when the presence of child labour in the household was accounted for.

These results are consistent with recent analysis of panel data from Kenya, Malawi, Mozambique, Rwanda and Zambia analysed by Mather *et al.* (2004, 2005), who found that the land/labour ratios and total income of rural households directly affected by PA adult mortality

are more heterogeneous than implied by some of the literature. On average, Mather *et al.* (2004) found that affected household has as many, if not more, PA adults following mortality than non-affected households. One reason for this may be the entry of new household members (Mather *et al.* 2005), especially in the case of a PA female death, as was found in Mozambique and Rwanda using recall data (Mather *et al*. 2004). Another explanation is that households which lose a household member tend to have on average more PA adults and a larger household size prior to death relative to non-affected households, as was the case in Kenya, Malawi, and Mozambique (Mather *et al*. 2005).

These results question the usefulness of a homogeneous conceptualization of "affected households," especially in the context of proposals for targeted assistance and technology development. The implications of this heterogeneity are important for the design of HIV and AIDS mitigation strategies, as well as for considering the HIV and AIDS epidemic within the context of rural poverty alleviation and growth strategies. For example, indicators beyond "adult mortality" are required to help identify affected households most in need of immediate assistance as well as what technology is most appropriate and beneficial for "affected households". Overall, the findings of this chapter are in agreement with Mather *et al.* (2005), who question blanket recommendations of prioritizing labour-saving technologies in agriculture following high incidence of HIV and AIDS. Moreover, given that households with recent female mortality most consistently rate their cultivated areas in smaller size-classes, returns to investing in labour saving technologies may be higher for technologies aimed at decreasing the amount of time spent on domestic tasks allocated to remaining women in the household, such as food processing and water/fuel gathering. This is particularly pertinent in light of recent research by Hunter *et al.* (2008) from the Limpopo province in South Africa, which has suggested that recent mortality increases the likelihood of male household-heads collecting water and fuel, which is traditionally a task performed by women.

Impact of chronic illness on agricultural activities

On the whole, PA chronic illness was found to be associated with a higher degree of investment in agricultural activity. Households with chronic illness were more likely to employ child-labour, tended to plant a significantly higher diversity of crops, and also had a larger overall plot-size. There was also evidence that child-welfare grants are the main source of seed-funding for these activities, due to the positive relationship between child grantees and agricultural activities.

The reasons for households with chronic illness having a higher mean investment in agricultural activity are at this point unclear. It may be that these activities are a conscious coping strategy implemented in response to a heightened sense of food insecurity, but it may also be that chronically-ill household members (and their caregivers) are increasingly confined to the homestead and thus more likely to occupy themselves in domestic activities. The possibility that the government's campaign to encourage those afflicted with HIV and AIDS to increase their consumption of vegetables has had an impact on people's behaviour should also not be ruled out.

Although households with chronic illness may be investing more heavily in planting crops, only households with chronically ill members receiving medical treatment actually showed evidence of higher levels of cultivated food in their household diet. With medical treatment, it is likely that both the afflicted PA and other household members who would potentially serve as caregivers to the sick household member would be more able to pursue cultivation activities. Those on treatment may also be more likely to engage in wage-earning activities, which would provide money necessary to purchase the fencing, water, pesticides and fertilizers often needed release the benefits of an initial agricultural investment. In contrast, for households with PA chronic illness not receiving medical treatment, their response of agricultural intensification does not lead to significantly higher levels of harvested foods in their diet, and in this sense has been a waste of household resources, and particularly a waste of the child-grant income that primarily funds these agricultural endeavours.

The lack of agricultural output experienced by households with chronic illness from their investments is interesting, given recent findings from rural KwaZulu-Natal that the income received by households from grants for fostering HIV and AIDS orphans does not appear to be positively associated with food security. Schroeder and Nichola (2006) have suggested this implies that care grants are being spent on non-food needs of the family. A refinement on this explanation may be, however, that care grants are been invested unwisely in food security strategies that fail to provide the anticipated relief.

CONCLUSION

Earlier studies predicted that HIV and AIDS would have a negative impact on both household labour availability and overall labour availability in the agricultural sector. However, as we have seen, this study supports a growing number of empirical, household-level studies from

eastern and southern Africa, which indicate that the amount of labour available for household agricultural activities does not necessarily decline following chronic illness and mortality. Rather, this study corroborates the suggestion made by Jayne *et al.* (2005) that the greatest impact of HIV and AIDS on the factors of farm production may be in the stock of capital assets and in the knowledge base which enables households to earn cash income to purchase inputs, which may present very different implications for the priorities of agricultural research and extension systems among "high HIV prevalence" countries. The few available empirical studies on the impacts of prime-age adult mortality on agricultural production and incomes indicate that the effects are more severe on households that were relatively poor to begin with (Drimie 2002; Yamano and Jayne 2004; Collins and Leibbrandt 2007). This is because farm households tend to utilize remittance and off-farm income as a primary means to afford expensive assets such as oxen, ploughs and fertilizer, which are used to capitalize farm production (Reardon *et al.* 1995).

This study strongly corroborated this position: in terms of agricultural outputs as measured by the number and diversity of cultivated foods in a households diet over time, the real "winners" in this study were not, as is often presumed in the literature, households with a large quantity of active adult labour or high household labour scores, but those households with a steady influx of earned wage-income. This finding is typical of the South African situation and has been observed in a number of contexts. For example, Hunter *et al.* (2007) found that household size (a proxy for available labour) was not correlated with likelihood of cultivating crops but was rather tied to socio-economic status. In a study on the contribution of agricultural production to household nutritional status in the Nkandla district in KwaZulu-Natal Kirsten *et al.* (1998) likewise found that agriculture improved the nutritional status of households only when production generated substantial monetary income, or when it enabled a substantial reduction in household food expenditure. Recently, in a study conducted in the dry-land regions of Limpopo province, Van Averbeke and Khosa (2007) found that the contribution of subsistence agriculture to household dietary composition was typically double in non-poor households compared to ultra-poor households.

As De Klerk *et al.* (2004) have noted of the South African context, due to the reliance of the rural poor on cash income for food, it is important to realise that agricultural upgrading is not necessarily the best way to improve rural food security. This is arguably becoming even more the case in the wake of HIV and AIDS, as HIV and AIDS is believed to accelerate the trend towards higher income diversification and a "deagrarianisation" (Bryceson 1996). Moreover, if HIV and AIDS causes a decline in the income and expenditure of rural South African households over time (Bachmann and Booysen 2004), it may be that the number of households who have the necessary income and assets to carry their initial agricultural efforts through to the

point of providing consumable products will also diminish. Unless more adequate support can be offered to HIV and AIDS-afflicted households without access to wage employment, the likelihood of achieving the desired outcome of households who not only invest in agriculture, but achieve success as subsistence agriculturalists, is questionable.

Chapter 5. The Use of Wild Leafy Vegetables in Household Dietary Responses to HIV and AIDS

INTRODUCTION

The preceding chapter examined the relationship between HIV and AIDS and household subsistence agricultural activities. Evidently, not all rural households are deriving benefits from home-cultivation activities: although many households have access to land; the ability of a household to successfully utilize this resource is mediated to a large extent by household assets, income, labour and also HIV and AIDS affliction.

In contrast, evidence suggests that the vast majority of rural households in South Africa derive some form of nutritional benefit from the harvesting and consumption of "wild" foods from the natural surrounds (Shackleton and Shackleton 2004). In some areas, the mass and diversity of wild leafy vegetables harvested from surrounding lands can rival (and at times exceed) that of cultivated crops (High and Shackleton 2000). Moreover, there are a number of suggestions in the theoretical (Gari 2004; Barany *et al.* 2005) and empirical literature (Mutangadura *et al.* 1999; Senefeld and Polsky 2005) that use of wild leafy vegetables constitutes an important food security coping strategy for the poorest and most vulnerable households, including those households afflicted by HIV and AIDS.

This chapter considers the role of wild leafy vegetables in the nutrition of rural households afflicted with HIV and AIDS. This is done through quantitative analysis of the HDDS survey instrument, which has been disaggregated by the source (e.g. wild) of the vegetables consumed by the household over the monitoring period. The extent to which wild leafy vegetables are incorporated into the household's diet over time is used to proxy the degree to which households access, invest in and derive benefits from wild natural capital. These data, in combination with the information derived from household interviews, and the CSI items relating to use of wild natural capital as a food security coping strategy, provides a means through which the association between wild natural capital, food security and HIV and AIDS status can be explored.

Defining wild vegetables in this study

In common with rural areas throughout sub-Saharan Africa (Fleuret 1979; Smith *et al.* 1996; Mertz *et al.* 2001), the people of South Africa have a rich history of use of wild edible plants (Bundy 1988). Historically, the collection of edible plants was particularly important during times of emergency, when crops had failed or livestock herds had been depleted (Pieres 1981). There is considerable evidence that indigenous knowledge regarding (and local use of) wild edible plants has persisted into modern times. In the 1970s, Wehmeyer and Rose (1983) identified more than 100 different species of plants used as leafy vegetables in the Eastern Cape. During this time of pre-1994 political struggle, Jansen van Rensburg and Vorster (2005) noted how people fleeing their houses to escape violence relied heavily on food collected from veld and forest for survival.

Just what constitutes a wild edible plant is somewhat contentiously defined. Because "wild" leafy vegetables and edible herbs are harvested from a range of habitat types and land-use mosaics, the descriptive category of "wild" is often misleading since it tends to imply the absence of human influence or management. This view is reflected in the definition provided by Guinand and Lemessa (2001, p1), where wild vegetables are defined as "all plant resources *outside of agricultural areas* that are harvested or collected for the purpose of human consumption in forests, savanna and other bushland areas" (own emphasis). However, as there is a co-evolutionary relationship between humans, local food sources and their environments, simple dichotomies like wild areas/wild plants versus disturbed areas/cultivated plants are not always useful in practice. Rather, it is useful to imagine a continuum between wild and cultivated areas and wild and cultivated foods (Shackleton *et al.* 2008). On the "wild" extreme of the continuum are plants that occur spontaneously, are untended and harvested on an *ad hoc* basis; on the "cultivated" end of the continuum, we find plants intentionally seeded and harvested, and grown as "traditional crops". Between cultivated and wild foods are plants that initially seed themselves, but through selective weeding and tending come to function as cultivated foods. Many herbaceous species, referred to collectively in this chapter as wild leafy vegetables that thrive in disturbed settlement-areas, fall within this category.

Some traditional foods are not usually gathered and cooked as a household meal, but are eaten raw, mainly by children. For example, in the Mt. Frere region Xhosa herd boys enjoy eating the leaves of *Gerbera ambigua* raw. The sweet, juicy bulbs and stems of the indigenous clover *Oxalis semiloba* root, called imiswempe (isimunyane in Zulu) were also commonly consumed. Children are also the ones who mostly use wild fruits, such as the *Dovyalis caffra* , the fruits of the forest lily *Dracaena hookeriana* or the gooseberry *Physalis peruviana*. Others, such as the

fruits of the blackberry *Rubus rigidus*, and wild figs *Ficus ingens* and *Ficus sur* are gathered and brought home for the family, or made into jams and fruit juices. Traditional tubers such as the taro *Colocasia esculenta* are known of, and very popular in KwaZulu-Natal, but in the Mt. Frere region did not occur widely. However, in winter, when vegetable gardens are bare, the bulbs of the indigenous morning glory *Ipomoea simplex* are quite commonly eaten. Although these wild fruits and tubers offer important nutritional inputs in their own right, they are very seldom incorporated into the household diet and their numbers did not reach statistical significance in dietary recalls. For this reason, only the use of wild leafy vegetables is considered in this study.

In the Eastern Cape and KwaZulu-Natal, local people refer to these wild leafy vegetable species collectively, using the term *imifino*, which freely translated means simple, leafy vegetables. As Jansen van Rensburg *et al.* (2007) note, the somewhat more dynamic concept of *imifino* is particularly useful when approaching leafy vegetables from the perspective of contemporary indigenous knowledge and practice, as what exactly constitutes *imifino* is subject to spatial and temporal variability. In other words, the plant species that are included in the collective *imifino* depend on the local ecology and culinary traditions (Van Wyk and Gericke 2000; Modi *et al.* 2006). By focusing on the use rather than the origin of plant species, the concept of *imifino* is subject to the addition of new species, or the so called "indigenization" of species that may be externally derived, but have naturalised into local environments and cultures (Philips-Howard 1999). In this way, *imifino* can in some traditions include the leafy vegetable species that form part of the culinary repertoire of particular contemporary African communities, embracing indigenous, indigenized and recently introduced plant species such as exotic Swiss chard (*Beta vulgaris*). However, for the purposes of this study, leafy vegetables such as chard were regarded as cultivated vegetables and only self-seeded, uncultivated varieties were included in the definition.

In line with this concept of indigenization, Jansen van Rensburg *et al.* (2007) define a leafy vegetable species as indigenized in a particular region when the species in question is externally derived but has since been incorporated in the local food culture. Indigenous leafy vegetables may thus be defined as plant species which are either genuinely native to a particular region, or which have been introduced to that region for long enough to have naturalised. In South Africa, and for the purposes of this study, these include naturalised weeds such as *Bidens pilosa* (blackjack), *Amaranthus spp.* (amaranth), and *Conchorus spp.*, which are commonly considered part of the repertoire of wild edible plants consumed by South African rural communities (Shackleton and Shackleton 2003). In a study of wild vegetables that were eaten in nine villages in the Bushbuckridge region, naturalised weeds (*Amaranthus spp.*; *Conchorus spp.*) and

nurtured herbs within homesteads or arable fields were included in the definition of wild herbs (Shackleton *et al.* 1998). In Swaziland, Ogle and Grivetti (1985) surveyed typical rural diets for evidence of wild foods, the bulk of which encompassed naturalised weeds growing in fallow or cultivated lands.

Extent of use wild leafy vegetables in rural diets

In post-apartheid South Africa, it has been argued that recent increases in access to and availability of social welfare grants have considerably modified local food consumption patterns, heralding a shift from reliance and use of local produce in favour of cash food purchases (Hendriks 2005). However, a number of recent papers have suggested that the use of wild edible plants continues to be widespread among African people in South Africa, and at times consumption may even exceed that of cultivated plants. In a study in Limpopo province, High and Shackleton (2000) found that households made use of four to five species of wild plants growing on their residential plot, whereas the mean number of crop plants was just 3.4. Moreover, wild plants represented 31 % of the value of all plants grown on residential plots, relative to 69 % for domesticated crops and fruit trees. Again in Limpopo province, Twine *et al*. (2003) found that 100 % of households used wild edible herbs, with a mean of 69 kg wet weight per household per annum. A later study by Dovie *et al.* (2007) found 15.4 kg dried weight per household per year were utilized by the majority of households. Recent ethno-botanical studies have also shown that widespread use of wild leafy vegetables is still common in rural areas in the Eastern Cape (Bhat and Rubuluza 2000; Jansen van Rensburg *et al.* 2007), and KwaZulu-Natal (Modi *et al.* 2006; Odhav *et al.* 2007). All in all, in a review spanning 14 villages across South Africa, Shackleton and Shackleton (2004) indicated that 96 % of rural households made use of wild edible herbs to some extent with a mean of 58 kg per household per year.

Wild foods as an HIV and AIDS "coping strategy"

In the late 1990s, a review by Mutangadura *et al.* (1999) highlighted the use of wild foods amongst households afflicted with HIV and AIDS, a commonly-recurring theme in studies exploring household and community-level responses to HIV and AIDS from the 1990s. In the early 2000s, the hypothesis was put forward that wild natural resources would be of heightened importance to local communities given of the impact of HIV and AIDS (Barany *et al.* 2001;

Campbell *et al.* 2002). Some commentators lauded the potential of these food sources to offer superior nutrition at low cost (Barany *et al.* 2001; Barany *et al.* 2005). Proponents were quick to point out that those suffering from HIV and AIDS can require up to 15 % more energy and 50 % more protein, as well as more micronutrients (Friss 1998; Haddad and Gillespie 2001; Beisel 2002). Wild leafy vegetables are often good sources of protein, and even wild leafy vegetables can offer up to 13 % protein (Ogle and Grivetti 1985). Wild leafy vegetables are also micronutrient rich. For example, a portion of *Amaranthus spp.*, commonly utilized throughout Africa as a green leafy vegetable, typically has 200 times as much Vitamin A as the same size portion of cabbage and more than 10 times the amount of iron. In sum, *Amaranthus spp.* provide about 4,500 units of vitamins per 100 g edible portion, compared with 600 g for Swiss chard and 280 g for cabbage (Schippers 2000). Wild leafy vegetables are also typically very rich in carotenoids. For example, *Amaranthus spp.*, *Chenopodium album* and *Bidens pilosa* have at least 200 times more carotenoids than cabbage (Kruger *et al.* 2005). Carotenoids along with Vitamin A have been shown to play a vital role in both reducing infection risk as well as slowing the progression of HIV into AIDS (Semba and Tang 1999; Kinyuy 2001; Piwoz and Preble 2002). For these reasons, it is likely that eating a range of wild foods boosts dietary quality and may contribute to the nutritional supplementation that HIV and AIDS sufferers require.

A number of commentators also suggested that wild leafy vegetables may be an appealing choice for households looking to adopt labour-saving coping strategies that maintain productivity while at the same time decrease cultivation intensity (Shah *et al.* 2002; Du Guerny 2002; Barany *et al.* 2005). These HIV and AIDS-aligned changes in crop choices are generally seen in terms of switches between cultivated crop-types, such as from maize to tubers (see Chapter 4), but few have considered the likelihood of a household switching from cultivated to non-cultivated crops. Moreover, it is further possible that the increase in fallow land that is believed to ensue as a result of HIV and AIDS (Mphale *et al.* 2002; Dwasi 2002; Shah *et al.* 2002; Du Guerny 2002; FAO 2003a; FAO 2004), may provide a regenerative niche for wild and naturally occurring food products, many of which are invasive, opportunistic species considered "weeds" in conventional agronomy.

In recent years, the suggestion that wild food-use is being greatly accelerated with the spread of HIV and AIDS has become so widely cited, that it has on repeated occasions been urgently flagged as a priority area for HIV and AIDS policy and planning, as well as conservation planning. In a report on the environmental dimensions of HIV and AIDS for the UNDP, Gari (2004) puts the need for in-depth analysis on the relationship between HIV and AIDS and wild plant resources foremost on the recommended conservation agenda, as does Quinlan (2004) in a

special report for the World Parks Congress on the implications of the "safety net" role of wild natural resources for HIV and AIDS-afflicted households for conservation and environmental management.

Evaluating the empirical evidence for wild food use given HIV and AIDS

The commentary cited above builds a persuasive theoretical argument for a relationship between accelerated use of wild foods and HIV and AIDS, but what empirical evidence is there to support this hypothesis? There is some empirical evidence that, during hard times, households may increase their consumption and/or sale of wild, "free" resources to tide them over until better conditions return (Angelsen and Wunder 2003; Paumgarten 2007), but it is not yet clear if these observations can be extended to HIV and AIDS contexts. Unfortunately, a number of empirical studies specifically investigating HIV and AIDS effects on use of natural resources appear to be largely anecdotal in nature. For example, in case studies from Kenya, Namibia, South Africa, Uganda and Malawi, both Dwasi (2002) and Mauambeta *et al.*(2002; 2003) cited accelerated use of wild foods as a characteristic of the agricultural diversification accompanying HIV and AIDS. However, these observations were based on interviews derived from rapid rural appraisal exercises and the effect was never quantified. Similarly, a case study of the relationship between HIV and AIDS and artisanal fishing in the Okavango Delta (Botswana) also asserted that informants used collection of wild fruits as an HIV and AIDS coping strategy, but again this effect was never quantified (Ngwenya and Mosepele 2007).

In southern Africa, studies have also, until very recently, been largely non-quantitative in nature. For example, Drimie (2003, p.16) has described only in very general terms how under-utilization of land is common amongst households afflicted by HIV and AIDS and that wild, self-seeded plants often dominate the landscape, as "inadequate weeding means that less (i.e. less cultivated food) is produced". Barany *et al.* (2001) also rely on mainly unpublished reports to substantiate their hypothesis that wild food use is accelerating in the context of HIV and AIDS. For example, the paper cites an FAO report from Mozambique on the impacts of HIV and AIDS on local livelihoods, where the collection of wild foods ranked as the second most important coping strategy in half the households surveyed. The report did not specify, however, if this coping strategy was cited with greater regularity in HIV and AIDS-afflicted households (Kayambazinthu *et al.* 2004).

In 2005, a study was conducted by Senefeld and Polsky (2005) in Zimbabwe with a view to exploring the impact of chronic illness on household food acquisition. The report found that

households with chronic illness reported significantly higher mean responses to the item relating to consumption of wild foods (Senefeld and Polsky 2005). This study was an important step forward in terms of quantifying the extent of the relationship between HIV and AIDS and wild food use. It should be noted, however, that the study did not adjust for the effect of household size in its analysis. This is potentially problematic, as presence of chronic illness in the household is more likely to be detected in larger households and, as Hunter *et al.* 2007) have noted, there can be a positive correlation between household size and use of wild foods.

Recent work by Hunter *et al.* (2007) and Twine and Hunter (2008) in Limpopo province has made an important contribution to these debates, through making use of more nuanced multivariate analyses that attempt to account for the influence of household socio-economic and demographic status when interpreting the relationship between HIV and AIDS-attributable mortality and use of wild natural resources. Their work, which has combined quantitative household surveys with qualitative research, has suggested that mortality-impacted households may use more non-edible natural resources to supplement previously purchased goods (Hunter *et al*. 2007; Twine and Hunter 2008), but their studies have failed to find a significant statistical relationship between the reported use of wild foods and household mortality.

Elsewhere in South Africa, McGarry (2007) has found evidence from qualitative interviews and quantitative dietary recall data to suggest that wild animal-source protein may be more utilized by children afflicted by HIV and AIDS in the Eastern Cape; but quantitative data from detailed dietary recalls which was used to compare the use of wild edible vegetables in afflicted versus non-afflicted children's diets was inconclusive. Moreover, an analysis based on the pilot conducted for this thesis also suggested that although use of wild foods may make households more economically resilient, households impacted by HIV and AIDS did not appear to be incorporating more wild foods in their diets, possibly due to labour constraints (Kaschula 2008).

Subsequent analyses by Twine and Hunter (2008) in Limpopo have offered support for this perspective. Twine and Hunter (2008) have found that HIV mortality-impacted households reported a significantly less diverse diet than controls and that this lower dietary diversity is attributable to a decreased use of cereals, fruits, and wild foods. This suggests that, if anything, HIV and AIDS-afflicted households are decreasing their use of wild foods, which in turn negatively affects dietary diversity. Furthermore, Twine and Hunter (2008) demonstrated that HIV-afflicted households were economically poorer than controls, and analyses which adjusted for household socio-economic status failed to maintain the significance of the relationship between HIV-status and decelerated wild food use. This finding is suggestive, as poorer households have traditionally shown heightened use of wild foods (Twine *et al.* 2003;

Shackleton and Shackleton 2006; Mamo *et al.* 2007), which indicates that HIV and AIDS afflicted households are acting counter-intuitively in their food security responses.

As has been demonstrated in the preceding two chapters, the situation in the three sites used in this study is somewhat different to that described by Twine and Hunter (2008) for Limpopo. Unlike the site studied by Twine and Hunter (2008), HIV and AIDS afflicted households have not demonstrated significantly lower socio-economic status relative to non-afflicted households (Chapter 3) and overall household dietary diversity is not lower in households with HIV and AIDS affliction. As such, different patterns in the manner in which households afflicted by HIV and AIDS utilize wild foods may be evident. If heterogeneity in household responses at the community-level can be identified, this will have important implications for how the relationship between HIV and AIDS, food security and natural resource use should be interpreted in different contexts. Given these considerations, this chapter aimed to evaluate through a combination of quantitative and qualitative means, whether wild leafy vegetables constitute a coping strategy for households afflicted by HIV and AIDS within the study sites.

METHODS

Study sites

Sites were the Mt. Frere region in the Eastern Cape, and the KwaDlangezwa and Nkandla settlements in KwaZulu-Natal. See Chapter 3 for full site descriptions.

Households sampled

Households were selected according to the presence of household HIV and AIDS proxies, using the sampling procedures described in Chapter 2. After data cleaning food security and dietary recall information were derived for a total of 307 households.

Food security and dietary intake information

Data on household food security status and the proportion of food groups derived from intake of wild leafy vegetables over time were derived from repeat assessments over a 12-month period,

which were used to derive an HDDS and CSI score for each household. See Chapter 2 and 3 for a full description of these indicators and sampling procedures associated with them.

Wild leafy vegetables consumption frequency

Two alternate measures of household-level consumption of wild vegetables were derived, which are outlined in the sections which follow. The first was a subjective, user-rated recall of the frequency with which the household consumed wild leafy vegetables over time. The second was objective, quantitative evaluation of the number of wild leafy vegetables incorporated into the household diet over time, as derived from a detailed 48 hr dietary recall (see methods Chapter 2)

Subjective recall information

Two alternate household-rated measures of wild vegetable frequency consumption were collected at each survey round, which are described below. These two measures were well correlated ($r=0.71$, $p<0.001$), and were summed to form a single, subjective food-consumption frequency recall index.

Item 13 in the CSI

Item 13 in the CSI related to the use of wild leafy vegetables as a food resource augmentation coping strategy (Chapter 2, Table 2.6). The incidence (0 or 1), multiplied by average weekly frequency (1–3) with which this coping strategy was utilized in the preceding three months, was summed over the four assessments for each household. This provided an alternate, subjective-recall measure of wild leafy-vegetable use in the household that was continuously, normally distributed, with a mean of 4.90 (±2.18).

Wild food frequency rating

At each assessment, households were asked to rate the incidence and frequency of their wild leafy vegetable consumption in the three months preceding each assessment. The product of

incidence (0 or 1) and frequency of consumption within a weekly time frame (1–3) at each assessment was then summed to derive a wild vegetable food-frequency rating for each household.

Dietary recall information

Using the data collected from the detailed 48 hr household dietary recall instrument over 12-months (methods, Chapter 2), a binary variable was constructed to reflect the low (equal to or below the median) or high (above the median) incidence of one or more wild leafy vegetable(s) in the household's dietary recall (HDDS) over the annual monitoring period. The number of times a wild leafy vegetable was incorporated into the household's diet over the monitoring period was also summed in order to get an index of the cumulative sum of wild foods eaten, which (being heavily left-skewed) was then categorized into low, intermediate or high levels. The percentage contribution made by wild foods to the total number of food types consumed by the household over the year was also calculated.

Data analysis

Data analysis was structured as follows. First, overall prevalence of wild leafy vegetables in household diets is discussed using descriptive statistics from this source-disaggregated HDDS. Next, binary logistic regressions were used to explore how continuous normally and non-normally distributed socio-economic variables and an indicator of the level of food security in the household are associated with the presence or absence of wild leafy vegetables in the household diet after 12-months. Next, the relationship between presence of wild leafy vegetables in the household diet and household labour-score is compared, using a comparison of the median household labour score for households with wild leafy vegetables, compared to the median labour score for households cultivating a variety of conventional crops. Binary logistic regressions are then used to explore whether ordinal categories of household HIV and AIDS proxy-score affects the odds of a household having wild leafy vegetables in their dietary recall. Finally, the number of wild leafy vegetables in the household's dietary recall after 12-months is compared to the household's subjective recall of how frequently wild leafy vegetables are consumed. Qualitative data are drawn upon to explain inconsistencies in these two alternate indicators.

RESULTS

Prevalence of wild leafy vegetables in household diets

Overall, 53 % of all households had at least one non-cultivated edible plant in their cumulated 8-days of dietary recalls, after 12-months. Of these households, 15 % were households without any other form of conventionally-cultivated crops in their dietary recall. KwaDlangezwa, where the sub-tropical climate meant that leafy vegetables were abundantly available in most months, had the highest individual site incidence (74 %). In Nkandla, incidence was (44 %), but this is likely to be an underestimation due to the severe drought experienced in Nkandla over the research period (Chapter 2, site descriptions). Mt. Frere had the lowest incidence of 38 %.

Characteristics of households with wild leafy vegetables in their diets

Socio-economic and demographic

After controlling for site, binary logistic models showed that presence of wild leafy vegetables in the dietary recall was negatively associated with household wage income, and for every additional R1000 earned per household per month, the odds of having a wild leafy vegetable decreased by 10 % (p=0.034, OR=0.9 CI=0.80-0.99]). Non-cultivated leafy vegetables were also more apparent in households with a lower average adult education category (p=0.047, OR=0.77 [CI=0.59-0.99]), but this effect was not significant when adjusting for household wage-income: which suggests that income, rather than its correlate education-level, was the discerning factor. Somewhat surprisingly, use of wild vegetables was not associated with household demographics, including the number of individuals in the household from the demographic groups who are traditionally believed to favour these foods: such as women, or the elderly.

Food security

In order to avoid complications with auto-correlation, household food-security status was analysed using the experience of resource augmentation (ERA) sub-component of the CSI, which refers specifically to the experience of food resource restriction (hunger). The ERA excludes items relating to food resource augmentation strategies, including item 13 which specifically explores the use of wild foods.

Although wild leafy vegetables were associated with household socio-economic status, use of wild leafy vegetables was not associated with household food security status. Binary logistic regressions showed that mean household ERR scores did not affect the odds of a household having one or more wild leafy vegetables in their dietary recall, with or without adjusting for household socio-economic status. These results suggest that although wild foods may be favoured by poorer households, these households are not necessarily more food insecure.

Household labour

Unlike most conventionally cultivated crops, presence of wild leafy vegetables in the diet was not associated with the household labour score (see methods Chapter 4). A comparison of the median household labour score for households with wild leafy vegetables, compared to the median labour score for households cultivating a variety of conventional crops, is indicated in Figure 5.1. Figure 5.1 shows that lettuce, beetroot and carrots/turnips are associated with higher median household labour scores, whereas sweet-potatoes, taro (*amadumbe)* and wild edible herbs are evident in households with relatively low labour scores.

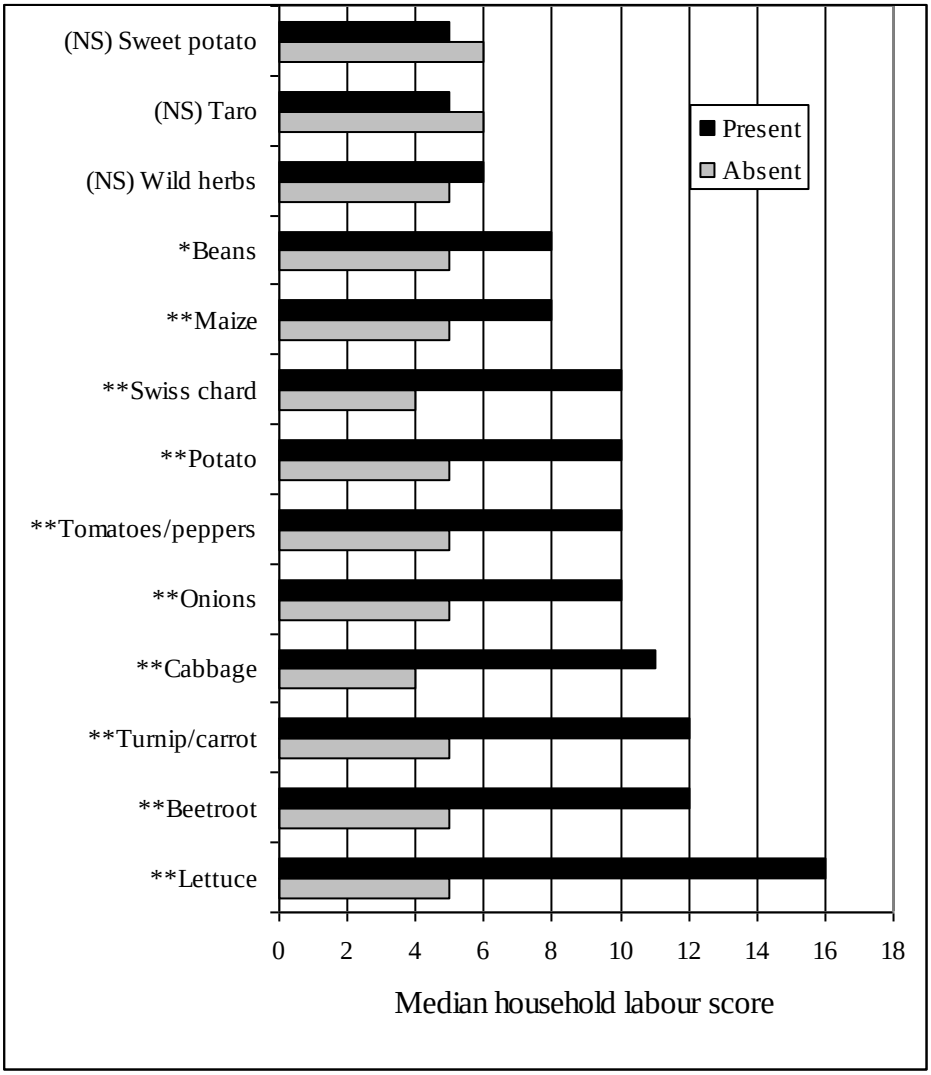


Figure 5.1. Median household labour scores in households that did/did not report cultivating a range of crops in the preceding planting season.

As wild foods are never cultivated, median labour scores for wild leafy vegetables are for households with and without one or more wild leafy vegetable(s) in their dietary recalls after 8-days of assessments over 12 months. NS= Kruskall–Wallis test statistic not significant, ** $p<0.01$, * $p<0.05$.

There was some evidence that wild foods offer an alternative source of edible natural capital to households who have recently reduced their diversity of planted crops. The average for all summed wild food frequency ratings (which included all wild foods consumed, not just wild leafy vegetables) was higher for households who reported a negative change in crop diversity over the past two years – as opposed to no change or a positive change. Ordinal logistic regressions showed that for every additional point in a household's mean wild food frequency rating, the odds of a household planting a lesser diversity of crops in the current (relative to the preceding) planting season increased by 20 % ($p=0.034$, OR=1.20 [CI=1.01-1.41]).

HIV and AIDS and household consumption of wild leafy vegetables

Site-disaggregated analysis showed that none of the household HIV and AIDS proxies were associated with the level of wild leafy vegetables (high/low) in a household's cumulative dietary recalls after 12-months. For example, households with recent mortality (0–56 yrs) (Figure 5.2), chronic illness (0–56 yrs) (Figure 5.3) and single parent orphans (Figure 5.4) had very similar proportions of households in the high and low wild vegetables categories as households without these proxies. Similar trends were observed for the other HIV and AIDS proxies in the full range of age-demographics used in this study (not shown). Chi-squared tests of association confirmed that the presence or absence of an HIV and AIDS proxy in the household was not associated with either presence of wild leafy vegetables in the diet over time, or the level of wild leafy vegetables in the diet (high or low).

Alternate analysis using binary logistic regression confirmed that the incorporation of non-cultivated leafy vegetables into the household diet was not statistically significant with the cumulative household indices, which was indicative of changes in health, demographic and socio-economic status of household members over time (see methods, Chapter 2). This held when adjusting for original household socio-economic status, labour availability and also other potential co-variants, such as the presence of cultivated foods in the diet. Alternate analysis, which explored the percentage contribution to wild leafy vegetables to the total number of food groups in the diet over four assessments (summed HDDS) also failed to yield significant results

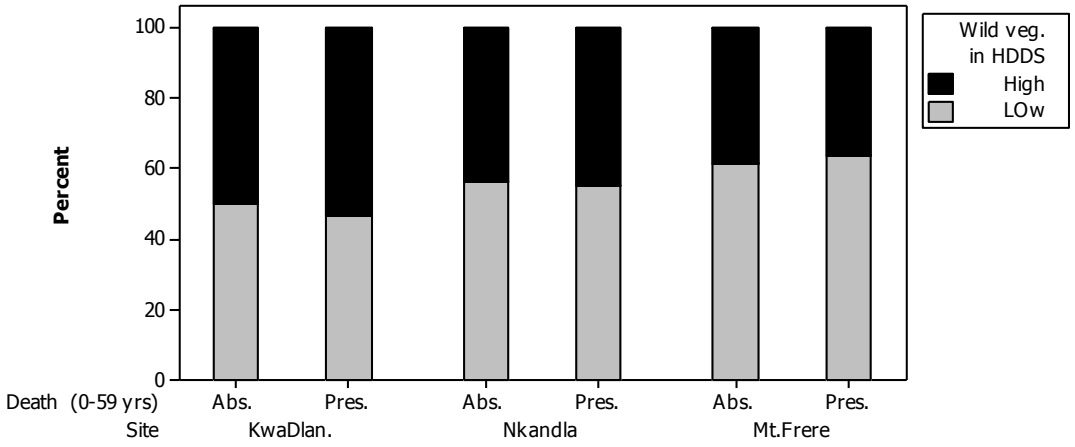


Figure 5.2. Percentage of household with high number of wild leafy vegetables in household's dietary recall given presence or absence of mortality (0–59 yrs).

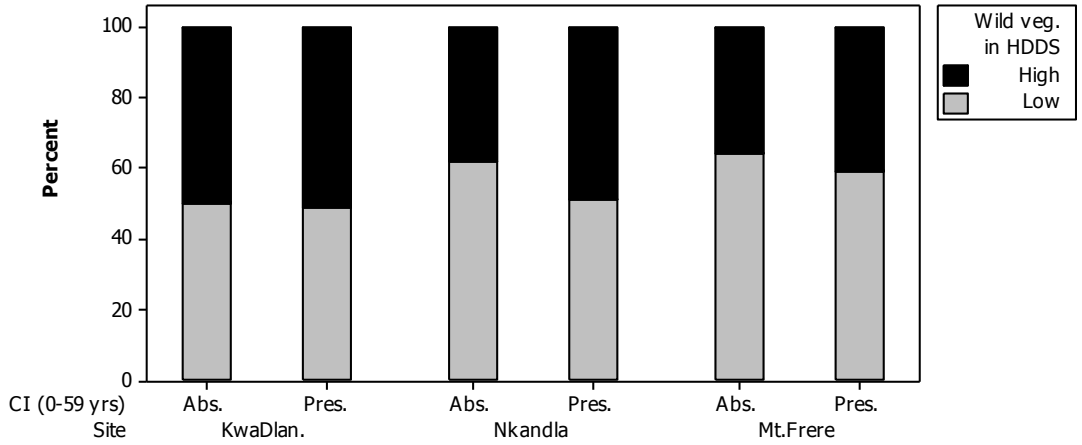


Figure 5.3. Percentage of household with high number of wild leafy vegetables in the household's dietary recall given presence or absence of chronic illness (0–59 yrs).

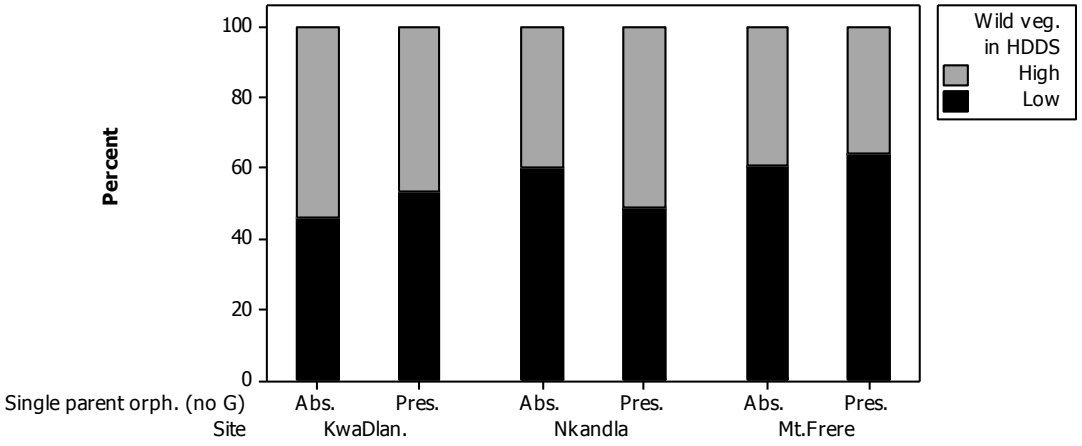


Figure 5.4. Percentage of household with high number of wild leafy vegetables in the household's dietary recall given presence of single parent orphans (no grants).

It is interesting to note that although the dietary recall information did not suggest that households with HIV and AIDS proxies had higher use of wild leafy vegetables, in KwaDlangezwa, households with recent mortality (in all proxy age-groups tested and for all genders) reported a higher frequency consumption of wild leafy vegetables (Figure 5.5 a). This effect was not statistically significant for other sites or for other HIV and AIDS proxies (Figures 5.5 b–d).

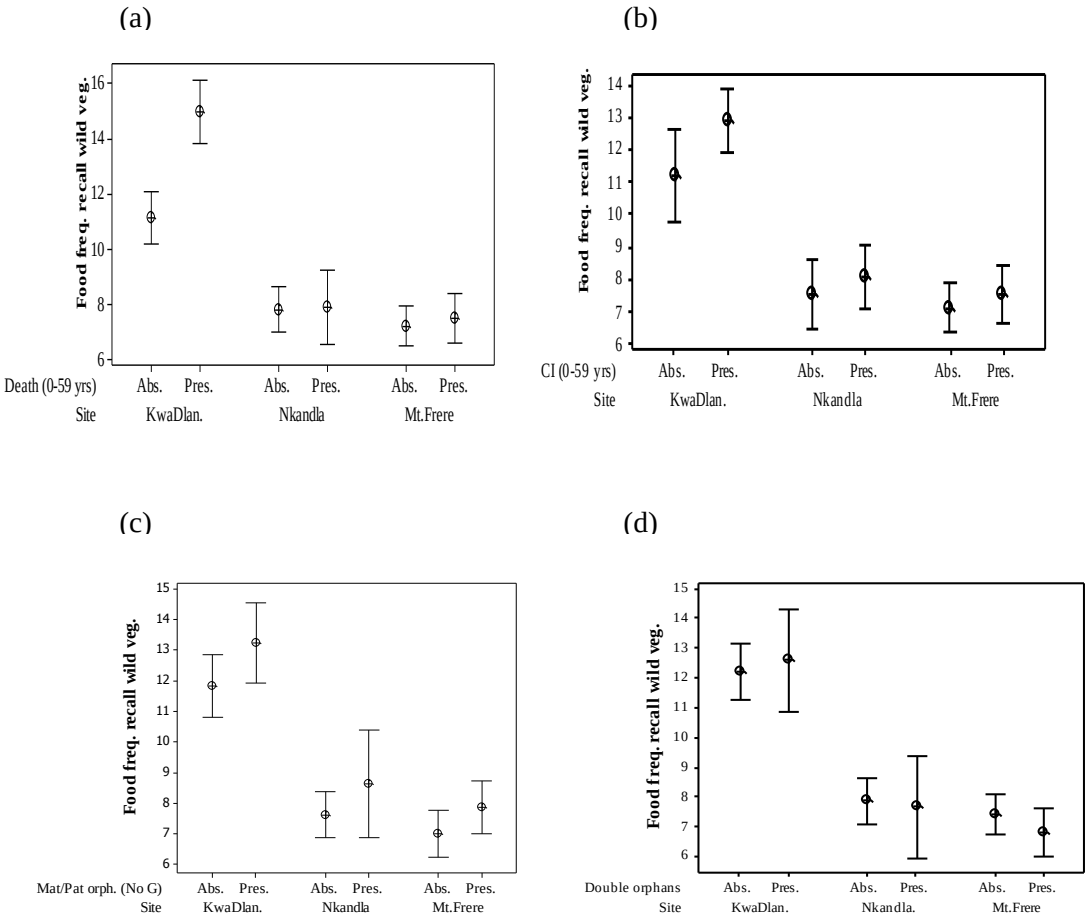


Figure 5.5. a–d. Mean consumption frequency ratings for wild vegetables, disaggregated by site and HIV and AIDS proxy.

The correlation between the two indices of wild vegetable frequency for the pooled site data was very good ($r=0.77$, $p<0.001$), which suggests that the subjectively-rated food frequency indicator was, overall, a good measure of actual wild vegetable intake as measured by the household dietary recalls. Yet there was a marked tendency for households with recent mortality to overstate their frequency of wild vegetable consumption, relative to the number of wild foods captured in their dietary recalls over time. This is illustrated in Figure 5.6, where separate slope regression lines are fit for the relationship between the household's subjectively-rated frequency of wild vegetable intake and actual number of wild leafy vegetables recorded in the household's dietary recalls after 12-months. Although the coefficient of the relationship between these two indices is similar for households with and without recent mortality, the mean

intercept for the estimated consumption by afflicted households is significantly higher.

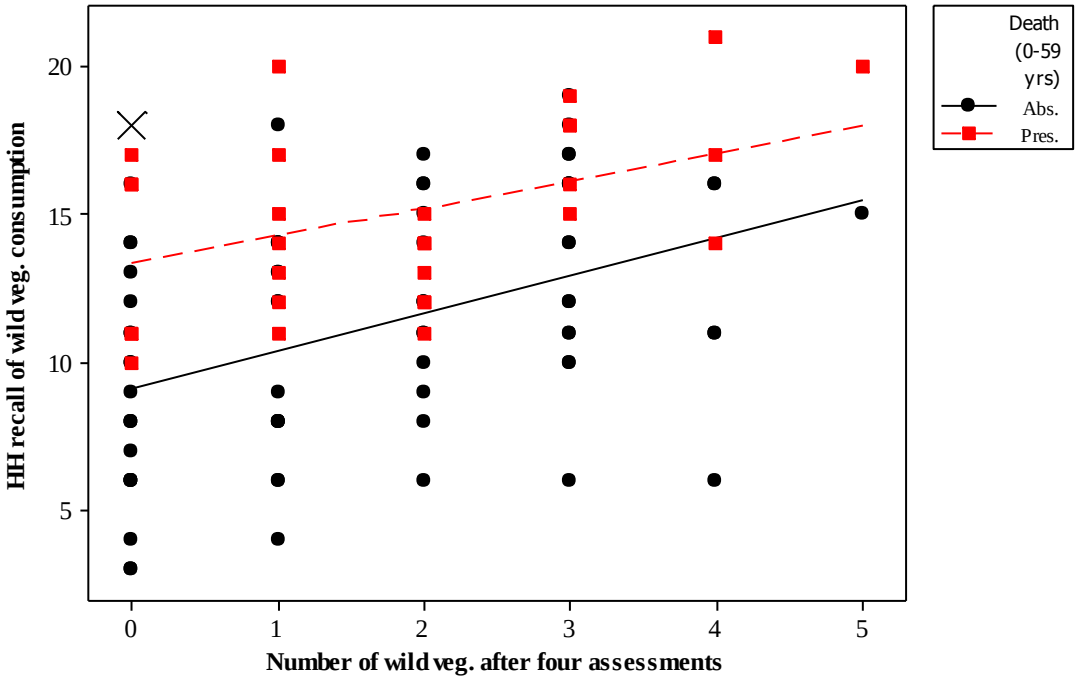


Figure 5.6. KwaDlangezwa households' recall of wild vegetable consumption against number of wild vegetables counted in the household's diet, in mortality afflicted versus unafflicted households.

The household marked X, is discussed in Box 1, below.

The relationship indicated in Figure 5.6 is particularly important to highlight because the tendency for households with HIV and AIDS to report a higher degree of reliance on wild foods is very commonly cited in the literature, both in terms of wild leafy vegetables (Dwasi 2002; Mauambeta *et al.* 2002; Mauambeta 2003; Gari 2004; Kayambazinthu *et al.* 2004; Hlanze 2005; Senefeld and Polsky 2005; Hunter *et al.* 2007; Kaschula 2008) and wild meat (Ngwenya and Mosepele 2007; McGarry 2007; Torell *et al.* 2007a; Torell *et al.* 2007b). However, it is becoming increasingly apparent that the few studies that have actually sought to quantify this trend at the household level are largely unable to provide evidence to confirm this trend (McGarry 2007; Kaschula 2008; Twine and Hunter 2008).

At this point, the quantitative data can offer little explanation for why these trends are evident. Given the level of enquiry, an examination of the qualitative contextual information for the study households would be more useful. The household marked with an X in Figure 5.6 was selected for more detailed case history examination, on the basis that this household (which was

also a HIV and AIDS mortality-afflicted household) had the highest mean wild vegetables frequency recall for a household without any wild leafy vegetables in their dietary recall after four 48 hr assessments, over 12-months. A detailed context for this household is provided in Box 5.1

Box 5.1. The Khumalo household.

The Khumalo house is, relative to the standards of KwaDlangezwa, a superior abode. The house has plastered walls and cement floors, and upon arrival we are ushered into a comfortable sitting-area with a number of well-worn sofas. We speak to Nonhlanhla (31), who is one of two wives of Dumusane (54). She insists that, although the face-brick and plaster house they live in is a "nice house", her husband inherited most of these assets. There is, she says, "just the house that was left to us by my husband's father. There is no money". Nonhlanhla tells us Dumisane earns a living through selling his labour for a mere R300 (US$30) per month. However, the situation has worsened in recent months, A few months ago, Nonhlanhla's brother Rulegani (34), who had a good job at a local hotel, died of HIV and AIDS. Since then, the household has struggled to purchase sufficient food for its eight remaining members. In consequence, Rulegani's orphaned daughter (10) is being fostered by the neighbours. For Nonhlanhla, life is hard. Although she herself is not well, she spends most of her time caring for her sick co-wife Bongi. In the household survey, she reports a high experience of food insecurity and a high use of resource augmenting coping strategies, including wild foods. Despite reporting a high use of wild vegetables, their diet in the preceding 48 hrs used only purchased foods and diversity was overall quite good, consisting of purchased cabbage, onions, carrot, dried beans and rice, and snacks of fruit.

At the second assessment, we are shocked to learn that Nonhlanhla had passed away. The household is in a state of disarray. The daughter of Nonhlanhla, 11 year-old Nomathemba, is now the oldest able-bodied female in the house, is responsible for the care of the still-sick Bongi and the cooking of meals. Little Sibusiso (8), Bongi's child, has now joined his cousin at the neighbour's house. Dumisane is still absent, working in Durban. Despite her age, we are left with no option but to interview Nomathemba, the *de facto* household head. Although Nomathemba reports that she often worries about food and tends to restrict portions accordingly, she tells us that the household does not go to sleep hungry. Overall, they have enough food, and from their dietary recalls, the household appears to be eating relatively well. Nomathemba says she often borrows from neighbours and gathers imifino. Despite this, there is

no evidence of wild foods in her recall; the household has eaten potatoes, rice, donated maize, meat and beans in the preceding 48 hrs.

When we return for the third assessment, new misfortune has afflicted the household. Bongi has passed away in a hospice. Desperately short of household labour, Dumisane has hurriedly taken a new wife, Bhekiwe (34), who now cooks the meals and looks after the children. Bhekiwe is somewhat abashed. It transpires that Dumisane has not yet paid her bride-price, which means she is no more than a "girlfriend" in the eyes of the community. We now learn from Bhekiwe that Dumisane in fact works in a cheese factory in Durban and not as a gardener earning a mere R300 per month as his deceased wives initially told us. This might explain the apparent ability of the household to maintain its levels of purchased food consumption (as well as, possibly, the apparent eligibility of Dumisane). It also transpired that the household breeds and sells chickens, which is a useful source of both food and income that was hitherto concealed. Yet despite these sources of household income, Bhekiwe expresses concern about the future. Times are uncertain and Dumisane's contract is anticipated to soon come to an end. Yet despite her concerns, their levels of food insecurity are lower than in the preceding assessments. Their levels of reported wild vegetable harvesting are now within the range of the site mean, which is harvesting on a weekly basis. There is still no evidence, however, of wild vegetables in their recalls.

At the fourth assessment, the household's status has improved for the better: both Dumisane and his son Sipho (21) have secured short-term contract work with Eskom. The household reports good levels of food security (3), and Bhekiwe tells us that they "never eat wild leafy vegetables anymore".

The story of the Khumalo household aptly illustrates what it means for a household to be afflicted by the HIV and AIDS "shock". To describe these three informants as vulnerable is an understatement. At the time of assessment, all three informants were in a state of profound psycho-social shock. Nonhlanhla had recently experienced the loss of income and mortality of her brother from HIV and AIDS. She herself was less than four weeks away from dying of HIV and AIDS, yet despite this she was responsible for nursing her co-wife, who would die some weeks after her. The second interviewee was a mere child (11) who had recently suffered the death of her mother and was burdened with the care of a sick woman, the responsibility of preparing meals and caring for the remaining children in the house. The final informant was a new wife, who had recently experienced a rapid change of social status and location due to household labour shortages following HIV and AIDS. She is unsure of her own status and of that of her husband.

Besides being characterized by high degrees of psychological unrest, the Khumalo household is notable for its marked vacillations in food security and socio-economic status. For this reason, a single assessment taken at the end of the monitoring period, when the household was no longer food insecure, would have grossly failed to accurately capture the overall household context, which is particularly pertinent to the CSI, which in turn is specifically designed as an indicator of acute (short-term) food insecurity (Maxwell 1996; Maxwell *et al.* 2003). The vulnerability and insecurity experienced by the household is a far more ethereal phenomenon than a quantitative survey could capture – a fact that the Khumao household would very likely have been aware of at the time of interviewing. It is thus hardly surprising that the Khumalo household concealed their true financial status, in order to more accurately convey the sense of vulnerability they felt. It is also not surprising that the informants reported a high degree of worry about food in their assessments, even though their actual dietary intake was quite good. Finally, it is perhaps not inconsistent with the overall context of the Khumalo household to understand why the household reported a high degree of reactive responses, such as use of wild foods. It could be that the Khumalo household, in their state of heightened vulnerability, had a heightened awareness of the importance of wild vegetables. It could be that the household genuinely believed they were harvesting these resources more than they actually were, or intended to harvest these resources more – but the labour constraints experienced by the informants made the realisation of this intent unlikely. It could simply be that, if a household is consistently painting their economic status in a worse light than it is, it may appear inconsistent if they do not similarly report a high experience of resource augmentation to the surveyor.

DISCUSSION

This chapter has raised important considerations about the nature and extent to which rural households are utilizing wild edible vegetables as a strategy for coping with HIV and AIDS. This chapter found that while there was good empirical evidence to support the view that wild leafy vegetables are more readily utilized by poorer households (Cavendish 2000; Angelsen and Wunder 2003; Twine *et al.* 2003; Timmermans 2004; Shackleton and Shackleton 2006; Paumgarten 2007; Mamo *et al.* 2007), there was no quantitative evidence for a greater use of wild foods in the diets of households with HIV and AIDS proxies. However, subjective recall information illustrated that households may tend to report higher use of wild foods, despite a lack of quantitative evidence to corroborate this position. Few empirical studies have attempted to collate qualitative and quantitative data in this way, but the few that have been conducted have found similar inconsistencies. A study from the Limpopo province of South Africa by

Hunter *et al.* (2007) attempted to link quantitative data on household use of natural resources with qualitative, interview data. Whereas quantitative data showed that presence of HIV and AIDS proxies was not significantly correlated with the likelihood of harvesting wild foods, people did, however, make numerous references to the usefulness of wild foods following hardships associated with HIV and AIDS in qualitative in interviews. McGarry (2007) found similar inconsistencies between quantitative records of wild food use, and qualitative reports which suggested the utility of wild foods as a coping strategy given HIV and AIDS.

Although these finding do not support the prevailing view that wild foods are an important coping strategy for households afflicted with HIV and AIDS, they are consistent with the indications from the preceding chapter on subsistence agriculture (Chapter 4). As Chapter 4 showed, although households with recent mortality may experience transient labour-constraints, there was no evidence that households cope with these labour shortages through switching to low-labour crops such as wild vegetables. Rather, households tend to respond through increasing child labour, or reduction of the amount of land cultivated, or a combination of these strategies (Chapter 4, models 1 and 2). Moreover, although this chapter suggested that wild foods may be more frequently utilized by households that have recently decreased their diversity of crops planted, as Chapter 4 (model 3) showed, households with prime adult chronic illness seem to be more likely to accelerate crop diversification in their planting regimen rather than curtail it.

In conclusion, it would appear that although wild leafy vegetables offer high nutrition, require no financial capital inputs and need comparatively small amounts of household labour in order to be incorporated into household diet, they are not necessarily more readily utilized by HIV and AIDS afflicted households. Households which are labour-constrained due to HIV and AIDS may readily acknowledge that wild food resources would certainly be rational decisions for households afflicted with HIV and AIDS and indeed, households and key informants were usually quite willing to own to the soundness of this reasoning in qualitative interviews and focus groups. However, coping strategies are not, by very definition, rational decisions. They are short-term responses fuelled by the immediacy of need (De Waal 1989). It has been argued that HIV and AIDS bears no similarity to the livelihood shocks communities have for centuries been responding to – rather, HIV and AIDS is 'a shock like no other' (Baylies 2002). Moreover, as the preceding chapter illustrated, household adjustments in subsistence agricultural activities in the context of HIV and AIDS for the most part show little evidence of strategy. Thus, although wild foods may well have a good basis theoretically for their inclusion into household diets following HIV and AIDS, this study has offered no empirical evidence to suggest that this is the case.

Chapter 6. Social capital, HIV and AIDS and household food security

INTRODUCTION

The preceding chapters have addressed the role of a range of livelihood capitals which underscore household food acquisition strategies; including natural, physical, human and financial capital. Notwithstanding the importance of these livelihood capitals to household food security, a proliferation of recent work has drawn attention to the importance of developing the concept of "social capital" in studies relating to human welfare. Specifically, a number of researchers have successfully demonstrated that incorporating a measure of the social cohesion, social involvement, and social protection experienced by populations and individuals strengthens models that attempt to explain underlying vulnerability to disease and mortality (Kawachi *et al.* 1997; Pilkington 2002; Galea *et al.* 2005; Saihpush *et al.* 2006). Social capital has been applied to models that explore vulnerability to HIV and AIDS (Poundstone *et al.* 2004). In Limpopo province, South Africa, Pronyk *et al.* (2008) have recently used panel data to demonstrate the relevance of social capital to understanding HIV infection risk and prevalence.

Although these epidemiological studies form a critical component of HIV and AIDS research, far more work is needed to explore the long-term impacts of the disease on broader socio-economic and development issues. Above all, the impact of HIV and AIDS on household food security has been placed at the forefront of these research agendas, as HIV and AIDS is widely acknowledged to be exacerbating poor nutrition and food insecurity in developing countries (de Waal and Tumushabe 2003; SADC FANR VAC 2003; Gillespie and Kadiyala 2005). Within this field, the role played by social capital in ameliorating (or exacerbating) the impact of health shocks on household food security is increasingly being acknowledged (De Waal and Whiteside 2003). Given this agenda, this chapter aims to explore how social networks of food exchange and reciprocity are associated with household-level social capital and food security, given the presence and absence of factors associated with household HIV and AIDS incidence.

Capitalising on the social in household food security

While there is no universal definition of social capital, there is a growing consensus that it includes trust, social participation and norms of reciprocity (Helliwell and Putnam 2004; Kawachi *et al.* 2004; Saihpush *et al.* 2006). However, in addition to embodying the norms of social interaction, social capital has also been very much tied to the concept of resource acquisition and exchange. In development discourse social capital forms a part of the sustainable livelihoods framework, which famously includes social capital as one of the essential resources that underscore the so-called asset pentagon of human, physical, natural, social and financial capital (DFID 1997). Kawachi *et al*. (1997, p.121) expand on this theme, defining social capital in terms of "the resources available to individuals through their behaviours and membership in community networks".

Within the context of household food access, social capital is thought to affect the acquisition and exchange of food between households, communities and individuals. This is especially important in times of hardship, and the recourse to neighbours and relatives for food is an important coping strategy that has been widely documented in a range of cultural contexts (Rangasami 1985; Pottier 1999; Maxwell *et al.* 2003). Recently, a group of American researchers conducted what they described at the time as the first study of its kind to explicitly explore the impact of social capital on household food access (Martin *et al.* 2004). Using an experience-based measure of food security similar to the ERR component of the CSI used in this thesis, the study found that within poor urban households in the USA, high social capital was associated with lower odds of a household experiencing hunger, even when controlling for household socio-economic status. The authors could offer no evidence as to why households with high social capital are more food secure, but suggested that the effect may be attributable to food resource reciprocity; as households with high social capital are potentially more able to borrow resources such as a car, money or food.

The work of Martin *et al.* (2004) suggests that high social capital may decrease the likelihood of a household experiencing hunger. If this finding holds across a range of contexts, it will have important implications for those working in the field of HIV and AIDS. This is because HIV and AIDS is not only believed to heighten food insecurity, but also to cause the "unravelling" of social capital networks (Bryceson 2003; Thomas 2006). Faced with these multiple determinants of unfavourable food security outcomes, the likelihood of a negative feedback between the onset of HIV and AIDS, declining social capital and accelerating food insecurity would seem to be a reasonable hypothesis.

In order to explore this hypothesis, Gertler *et al.* (2006) recently analysed Indonesian panel data spanning six years in order to examine the role played by social capital in mediating the impact of health shocks on household welfare. As Gertler *et al.* (2006) acknowledged, reliance on household expenditure as an outcomes variable for household welfare given health shocks is problematic, as much of the assistance derived from social capital networks is not delivered in cash, but in kind (Webley and Lea 1993). Gertler *et al.* (2006) hypothesized that the children of households with high social capital would be provided with meals by neighbours in times of sickness. In order to test this hypothesis, the researchers used child height-for-age (i.e. stunting) scores as a household wellbeing indicator that would validate the role of social capital-linked food transfers on household nutrition in the presence of adult morbidity. They found that changes in child height-for-age scores between two assessments were not significantly different for households with or without high social capital, following health declines of a household adult. This finding suggests that although social capital may be independently and positively associated with both human health and the spread of disease (Kawachi *et al.* 1997; Pilkington 2002; Galea *et al.* 2005; Saihpush *et al.* 2006; Pronyk *et al.* 2008), the ameliorative effects of social capital on household welfare and food security has yet to be established. Thus, whereas research by Martin *et al.* (2004) claims to have found evidence to support the theory that social capital is independently associated with household food security, Gertler *et al.* (2006) reject the hypothesis that high social capital has any measurable "benefit" to the household, as it appears to play no role in ameliorating the impacts of heath shocks on household expenditure and food security outcomes.

How are we to evaluate these conflicting perspectives? Firstly, it is useful to critically examine the analyses conducted by Gertler *et al*. (2006), and to recognize that the researchers were constrained by the limitations of the panel data made available to them. In order to evidence an ameliorative effect of social capital-linked food transfers on household food security over time, the study used the change in anthropometric measures for children aged 0–5 over a 4 year reassessment gap. As anthropometric measures are generally only considered good indicators of nutritional status for children under the age of five and measures of stunting are generally only seen as reliable for children under three (Cogill 2003), the validity of using the change in anthropometry over a four-year long time frame is questionable. Moreover, stunting in children is increasingly acknowledged to be strongly affected by maternal nutrition during foetal development (Frongillo 1999; Cogill 2003). Much of measured children's height-to-age scores would thus be a reflection of maternal nutritional status at a time outside of the scope of the study. Given these considerations, it is possible that Gertler *et al*. (2006) did not fully gauge the extent of social capital-linked food transfers due to the limitations of the food security outcomes indicator chosen.

A second worthwhile consideration is that we have, as yet, failed to verify the pivotal hypothesis that elevated social capital results in more social transfers of food to the household or individual and thus greater food security. This hypothesis can be considered unverified because studies to date have only demonstrated a statistical association between household food access indicators (such as child anthropometry and experience of hunger) and social capital indicators. It has not, however, been empirically verified that households with greater social capital receive more food resource transfers. If this cannot be validated, simply demonstrating a positive statistical association between social capital and food security has little value, as the association might well be attributable to covariates not known to the researcher.

One way to bypass this problem would be to measure directly the incidence and quantity of food transfers accrued by an individual or household over an extended period of time. Once a reliable, empirical measure of the social transfers has been made, the significance of these transfers can then be evaluated within the context of the household's overall food security status, social capital levels and, if desired, the degree of HIV and AIDS affliction. This study sought to employ such a method, by monitoring over a 12-month assessment period the contribution of social transfers of food to the dietary intake of households. At the same time, measures of household social capital, household food security, household socio-economic and HIV and AIDS status were incorporated into analysis, so as to account for their significance. Although the study design was essentially quantitative, qualitative detail in the form of detailed interviews and case studies was used to supplement the quantitative data.

Given this framework, the hypotheses of this study were that: (1) the level of social capital in a household is positively associated with household socio-economic and household food security status, but negatively associated with household HIV and AIDS status and (2) the likelihood of a household receiving food transfers is positively associated with household social capital and household food security status, and negatively associated with household HIV and AIDS status. Specific methods and instruments used to test these hypotheses are detailed in the sections that follow.

METHODS

Study Sites

The study populations were: the settlement of Moloweni near Mt. Frere in the Eastern Cape province; in the Province of KwaZulu Natal, the Mahlayizeni settlement in Nkandla and the KwaDlangezwa settlement in Zululand. See Chapter 2 for full site descriptions.

Measures of food security and food transfers

A total of 307 households were assessed over a 12-month period. See Chapter 2 for a full description of household sampling criteria and procedures. Households were subject to four 48 hr detailed dietary recalls, as well as an experienced based-measure of food insecurity (the CSI). These two indicators were used as measures of household food security. Full methods for these indicators are fully described in Chapter 2.

For a measure of food transfers, dietary recalls were disaggregated into food types consumed and the source of each food type – which included acquisition via food transfers or donations from neighbours, family or friends. Donations from aid organisations were very rare in the study sites (they were only recorded in two households) and were thus excluded from the food transfer category. At the conclusion of the 12-month assessment period, the number of food-types accrued through food transfers were summed for each household.

Social capital measure

To measure social capital, a seven-item Likert scale with four response categories was used. This scale was adapted from an instrument used to measure the collation between experience of hunger and social capital used by Martin *et al.* (2004), which in turn was adapted from an instrument developed and validated by Sampson *et al.* (1997). Sampson's index was designed to measure social cohesion, participation, values, trust and norms of participation and reciprocity. At the time of its development, this range of dimensions of social capital were been shown to have a similar underlying structure and clustering of variables in a number of contexts, including Ghana and Uganda (Narayan and Cassidy 1999). Moreover, the items used in the index have been shown to be suitable for aggregation as a simple, unweighted summed index, as the items have good internal consistency: with Chronbach's alpha scores usually exceeding

0.7 (Sauerbarn *et al.* 1996; Narayan and Cassidy 1999). Subsequent work has used these same concepts to define the importance of social capital in terms of issues relating to human health and well-being (Kawachi *et al.* 1997; Helliwell and Putnam 2004). Moreover, many of the elements of the index used in this study are similar to those used in a recent South African study exploring the relationship between social capital and HIV and AIDS (Pronyk *et al.* 2008).

Responses in the social capital index were divided into "strongly disagree", "disagree", "agree" or "strongly agree" with score allocations ranging from 1 to 4, respectively. Two questions that were worded negatively were reverse coded. The social capital scores ranged from zero to twenty eight for seven questions. The questions were also collapsed into binary indicators scoring 0 for a negative response and 1 for a positive response. The following questions comprised the social capital scale:

1. People around here are willing to help their neighbours.

2. This is a close-knit, or ''tight'' neighbourhood where people generally know one another.

3. If I had to borrow R50 (US$5) in an emergency, I could borrow it from a neighbour.

4. People in this neighbourhood generally don't get along with each other.

5. People in this neighbourhood can be trusted.

6. If I were sick I could count on my neighbours to shop for groceries for me.

7. People in this neighbourhood do not share the same values.

The following additional questions regarding residency were asked in this study

1. How long have you lived in your house?

2. How long have you lived in this village?

As group membership and civic involvement are considered important aspects of social capital, the following question was included.

Is anyone in your household a member of any social or civic organization, such as the PTA, a community organization, or a religious organization?

The median response for the 28 point scale was calculated for each site, and binary variables indicating high or low social capital relative to the site median were constructed.

Household socio-economic and HIV and AIDS profile

Household HIV and AIDS proxies were recorded. See Chapter 2 for a full description of the HIV and AIDS proxies used, as well as information on the household socio-economic and demographic variables collected.

DATA ANALYSIS

Continuous data were checked for normality of distribution, and where possible transformed. For data that could not be transformed to normality, non-parametric methods were used. All data presented in results tables are means and standard deviations for untransformed data.

Data were analysed in three phases. First, t-tests and Kolmogorov–Smirnov tests were used to compare mean household socio-economic and food security scores given high or low social capital. In order to explore whether or not the inclusion of social capital scores in analyses could be useful in anticipating household food security outcomes, simple and multiple linear regressions were preformed using the CSI scores as a dependent food security outcome variable, and continuous social capital scores and log transformed household income as independent variables. Pearson's χ^2 test statistics for categorical data were used to test for significant associations between presence of household HIV and AIDS proxies and household social capital level. Mean numbers of HIV and AIDS proxies accumulated in the household were also compared for households with low and high social capital. Binary logistic regressions were then used to further explore how the likelihood of having high or low social capital is affected by the presence of AIDS proxies, with or without controlling for potential covariates. Qualitative data were used to enrich and inform statistically significant relationships.

Next, the association between household social capital and incidence and intensity of food transfers was explored. Kolmogorov–Smirnov tests were used to compare mean social capital scores of households with or without donated foods, as well as to examine the proportion of households accruing donated foods over the monitoring period, given high or low social capital.

Finally, t-tests and Kolmogorov–Smirnov tests were used to compare mean household socio-economic and food security scores given the presence or absence of transferred food in the household. The association of household AIDS proxies with transferred food incidence was tested using Pearson's χ^2 test statistics for categorical data. Binary logistic regressions were

used to explore how the likelihood of having a transferred food is affected by the presence of HIV and AIDS proxies, with or without controlling for potential covariates. The case history profiles of three households with a very high intensity of food transfers were then used to illustrate some of the dynamics underpinning social transfers of food in the context of HIV and AIDS.

RESULTS

Household socio-economic status and social capital

In all three sites, households with high social capital had higher mean earned, welfare grant and total monthly incomes (Table 6.1). These mean differences were, however, only statistically significant in Mt. Frere, where households with high social capital had almost double the gross monthly income of households with low social capital. Mt. Frere households with high social capital also had more employed adults, a higher average adult education level and higher PCA-weighted wealth indices. Quite surprisingly, however, households with high social capital did not have higher numbers of livestock. In all three sites, mean length of residence in both home and the village was greater in households with high social capital. However, this trend was only statistically significant in KwaDlangezwa, where households with high social capital had a mean village residence of 60 years (±28), as opposed to 41 years (±19.8) years for households with low social capital.

Household food security and social capital

Although households with low social capital were on the whole poorer than households with high social capital (Table 6.1), low social capital-status was only associated with heightened food insecurity in Nkandla (Table 6.2). Nkandla households with low social capital had a higher mean experience of resource restriction (the ERR sub-component of the CSI), with households being more likely to report having no food at all in the households, going to sleep hungry and not eating at all for a whole day. Households with low social capital were also more likely to practice resource augmentation coping strategies, as reflected in their higher experience of resource augmentation (ERA sub-component of the CSI) scores.

Table 6.1. Mean values for key continuous socio-economic variables in each site, given high and low household social capital. *p<0.05, **p<0.01.

	KwaDlangezwa					Nkandla					Mt. Frere				
	Low Social Capital (n=51)		High Social Capital (n=51)			Low Social Capital (n=53)		High Social Capital (n=44)			Low Social Capital (n=60)		High Social Capital (n=48)		
	Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev	
Number of years in HH	39.3	19.8	49.6	22	*	28.3	23.4	27.3	24.4	NS	22	13.7	22.6	12.3	NS
Number of years in village	42	20.8	57.2	27.8	**	43.1	27.1	40.2	22.8	NS	30.6	18.1	23.8	12.3	NS
HH member of social org.	0.1	0.3	0.1	0.3	NS	0	0.1	0.1	0.3	NS	0.1	0.3	0.3	0.5	NS
Number of adult females	2	1.3	2.1	1.2	NS	2.2	1.4	2.7	1.8	NS	1.5	0.8	1.4	1.2	NS
Number of adult males	1.7	1.3	1.6	1.2	NS	1.7	1.2	1.4	1	NS	0.8	1	0.9	1	NS
Number of adults	3.5	1.8	3.7	1.9	NS	3.5	1.7	4.2	2.2	NS	2.5	1.5	2.3	1.4	NS
Size of HH	7.2	2.7	7.4	3.8	NS	7.2	3.7	8.6	5.1	NS	5.6	3.3	5.4	3.1	NS
Average adult education level	3.2	1	3	0.9	NS	3	1	3.1	0.8	NS	3	0.9	3.6	1	**
PCA-weighted wealth index	1.2	0.2	1.2	0.2	NS	0.8	0.2	0.6	0.2	NS	0.7	0.2	1.1	0.2	*
Weighted sum of livestock	0.3	1	0.7	1.9	NS	4.2	7.7	4.3	6.6	NS	3.4	6.7	1.8	2.6	NS
Employed adults	1	0.8	1.3	1.3	NS	0.9	0.9	0.7	0.7	NS	0.6	0.7	1.1	1.1	NS
Unemployed adults	2.6	2.3	2.5	2.6	NS	3	2.5	4.3	3.3	NS	2.9	2.4	1.9	1.9	*
Ratio employed: unemployed	0.6	0.7	1.1	2.3	NS	0.5	0.7	0.3	0.3	NS	0.4	0.8	0.7	0.9	NS
Earned monthly income	1,014	1,481	2,226	3,305	NS	1,076	1,391	1,273	2,351	NS	716	1,000	2,368	4,117	NS
Grant monthly income	1,033	738	1,035	639	NS	985	889	1,164	826	NS	1,042	821	983	759	NS
Total monthly income	2,046	1,530	3,261	3,371	NS	2,061	1,534	2,437	2,860	NS	1,758	1,097	3,351	4,040	*
Income per capita	525	561	325	256	NS	351	392	288	255	NS	470	520	981	1,281	NS
Age HHH	56.8	15.4	59	16.5	NS	55.8	16.4	60.3	13.8	NS	55.8	15	56.7	14	NS
Ratio children:adults	1.4	1.4	1.1	0.8	NS	1.2	1.4	1.1	0.7	NS	1.7	2.4	1.7	1.5	NS

Table 6.2. The mean response category (0–4) for households with high and low household social capital after four assessments for individual items in the CSI, and source-disaggregated HDDS. *p<0.05, **p<0.01. Statistical significance is for summed scores after four assessments.

	KwaDlangezwa					Nkandla					Mt. Frere				
	Low Social C. (n=51)		High Social C. (n=51)			Low Social C. (n=53)		High Social C. (n=44)			Low Social C. (n=60)		High Social C. (n=48)		
	Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev	
1. Worry over food	1.8	0.6	1.9	0.3	NS	1.6	0.4	1.5	0.5	NS	0.8	0.6	1	0.6	NS
2. Eating non-preferred food	2	0.6	2	0.4	NS	1.7	0.5	1.6	0.4	NS	0.7	0.4	0.9	0.7	NS
3. Limited food variety	1.9	0.5	1.9	0.4	NS	1.8	0.4	1.6	0.5	NS	0.9	0.5	0.9	0.6	NS
4. Eating embarrassing foods	2	0.5	1.9	0.4	NS	1.7	0.4	1.5	0.5	NS	0.8	0.5	0.8	0.6	NS
5. Smaller portions	1.5	0.8	1.5	0.6	NS	1.2	0.6	1.1	0.6	NS	0.8	0.6	0.8	0.6	NS
6. Fewer meals in the day	1.6	0.8	1.6	0.6	NS	1.1	0.7	0.9	0.7	NS	0.2	0.2	0.2	0.2	NS
7. No food at all	1.1	0.8	1.1	0.6	NS	0.9	0.6	0.5	0.6	**	0.3	0.3	0.3	0.4	NS
8. Go to sleep hungry	0.4	0.5	0.8	0.6	NS	0.8	0.6	0.3	0.5	**	0.3	0.3	0.3	0.3	NS
9. Doesn't eat all day	0.5	0.5	0.6	0.5	NS	0.6	0.6	0.2	0.4	*	0.3	0.4	0.3	0.4	NS
ERR total	12.8	4.1	13.4	3.3	NS	11.3	3.1	9.1	3.4	**	5.1	2.8	5.5	3.4	NS
10. Borrow food	1.2	0.7	1.4	0.6	NS	1.4	0.6	1.2	0.6	NS	1.1	0.5	1.2	0.6	NS
11. Sell livestock for food	0.3	0.5	0.2	0.2	NS	0.4	0.5	0.1	0.2	**	0.2	0.4	0.1	0.2	NS
12. Buy food on credit	0.5	0.6	0.6	0.5	NS	0.7	0.5	0.3	0.4	**	0.7	0.5	0.7	0.6	NS
13. Gather imifino	1.5	0.5	1.7	0.5	NS	1	0.5	1.1	0.5	NS	1.3	0.4	1.3	0.4	NS
14. Hunt for food	0.1	0.2	0.1	0.2	NS	0.1	0.2	0.1	0.2	NS	0.2	0.4	0.3	0.3	NS
15. Harvest immature crops	0.3	0.5	0.2	0.3	NS	0.3	0.4	0.1	0.2	NS	0.4	0.4	0.4	0.4	NS
16. Work for food	0.2	0.3	0.2	0.3	NS	0.2	0.3	0.1	0.3	NS	0.3	0.3	0.3	0.3	NS
ERA total	4.2	1.9	4.3	1.7	NS	4.1	1.6	3	1.3	**	4.2	1.6	4.2	1.4	NS
CSI total	17	5.3	17.8	4.6	NS	15.5	4.3	12.1	4.4	**	9.3	3.9	9.7	4.4	NS
HDDS total	8.4	1.3	8.4	1.4	NS	7.6	1.4	8.1	1.6	NS	9.5	1.5	10.1	1.9	NS
Ave. no. wild fd. types	0.4	0.3	0.5	0.3	NS	0.2	0.3	0.2	0.3	NS	0.2	0.2	0.2	0.2	NS
Ave. no. donated fd. types	0.2	0.4	0.2	0.4	NS	0.5	0.7	0.2	0.4	NS	0.4	0.5	0.5	0.6	NS
Ave. no. cultivated fd. types	0.3	0.4	0.4	0.4	NS	0.2	0.4	0.2	0.3	NS	0.8	0.8	1	0.8	NS
Ave. purchased fd. types	7.6	1.5	7.4	1.6	NS	6.9	1.6	7.5	1.7	NS	8.4	1.6	8.9	2	NS

The coping strategies most likely to be augmented were sale of livestock and purchasing of food on credit. The cumulative effect of these coping strategies resulted in a significantly higher CSI in households with low social capital. Logistic regression showed that for every additional point scored on the CSI, the odds of having high social capital in Nkandla decrease by 11 % (p=0.002, OR=0.83 [0.74 – 0.93]). In contrast, for Mt. Frere and KwaDlangezwa, none of the food security variables were not significant.

The above analyses suggest that social capital might be a useful variable to include in multivariate analyses that probe the determinants of household food security status in Nkandla. Simple linear regressions performed on the Nkandla data show that total log household income has only weak predictive ability for household CSI scores (Coeff. = -3.20; t=-2.64, p=0.01; r^2 = 6.7 %). Social capital scores were much better sole predictors of the CSI (Coeff. = -0.79; t=-4.69, p<0.001; r^2 =20.2 %). Multivariate analyses confirmed that social capital and household income have an additive effect on food security outcomes and that the best model fit was derived through the inclusion of both social capital and log household income as predictors of CSI scores (Intercept = 41.9, Coeff. Log Income = -3.16, p<0.01; Coeff. Social Capital = -0.86, p<0.01; t=7.65, r^2 = 26.3 %, r^2 (adj.) = 24.6 %). It is notable that although social capital scores account for over 20 % of the variability in CSI outcomes in Nkandla, social capital scores were not even marginally significant in comparable regressions conducted on the Mt. Frere and KwaDlangezwa data sets.

Why was there an additive relationship between social capital and household income for Nkandla, but not in Mt. Frere and KwaDlangezwa? Adato *et al.* (2006) suggest that social capital networks enable fortification of household wellbeing chiefly through the spreading of opportunities for employment, advice and contacts to employers. Thus, in a context where employment is erratic and informal, it is possible that the social networks held by a household would be a more telling indication of household food security status than the mean regular monthly income reported by informants. Moreover, in Nkandla the degree of difference between household's wealth-proxies and household income was very small: in other words, households were extremely homogenous in terms of wealth, income and asset ownership (see Chapter 2, site description). In the absence of financial asset discerners of household status, it may be that social capital networks become especially critical to determining household wellbeing. In such contexts, the high predictive power of the social capital index on food security outcomes suggests that social capital indices may be worthwhile components for inclusion in food security mapping systems.

Household HIV and AIDS status and social capital

Aggregate indices of household HIV and AIDS proxies were not associated with household social capital level in any of the sites. ANOVAs showed that "non-afflicted" (no proxies), "borderline afflicted" (1–2 proxies) and "afflicted" (3–5 proxies) households did not have significantly different mean social capital scores in any of the three sites or for pooled data. Simple linear regressions that regressed social capital scores against the total number of HIV and AIDS proxies (that is, 0–5) in the household were also not significant in any of the three sites or for the pooled data.

Analysis of individuals HIV and AIDS proxies did, however, yield significant results. The fostering of paternal orphans was associated with higher social capital in the pooled data analysis. Disaggregated analysis performed on the individual items in the social capital index found that paternal orphan fostering households were almost twice as likely to indicate assent for the item, "If I needed to, I could borrow R50 from a neighbour in an emergency" (OR=1.96 [CI=1.13-3.40], p=0.017). This is interesting, as households fostering paternal orphans were amongst the most vulnerable households surveyed. Presence of paternal orphans in the households was associated with significantly higher food insecurity, as indicated by CSI scores. In comparison, households fostering maternal and double orphans did not have heightened food insecurity. In households with paternal orphans, for every additional point on the household's mean annual CSI score, the odds of a household fostering a paternal orphan increased by 5 % (p=0.016, OR=1.05 [CI=1.01-1.10]). Inter-site variability, as well as household income per capita were not significant covariates in this relationship, although the model fit was significantly higher after the incorporation of these variables (p=0.003, Adjusted OR=1.09 [1.03-1.15]). These data is supported by qualitative evidence that suggests that households fostering paternal orphans are particularly vulnerable to food insecurity and more likely to build social capital ties (Box 1).

Box 6.1. Households fostering paternal orphans: a particularly vulnerable group

Why are households that foster paternal orphans more food insecure than those fostering maternal orphans, or even double orphans? This question was raised in a number of focus group discussions in KwaDlangezwa. Informants suggested that maternal orphans are often much better off, because when a child's mother dies, the child is treated as "parent-less", and thus efforts are usually made to find the child a suitable surrogate family that could adequately support it. When a child's father dies the paternal orphan is not considered a "true" orphan, and is likely to remain with its mother. These single mothers, who have often been widowed by HIV and AIDS and are themselves suffering from chronic illness, can

be highly vulnerable to poverty, displacement, and food insecurity. The case study detailed below illustrates the particular vulnerability experienced by widows with paternal orphans.

Nelisiwe (66) and Fikile (37) are two wives of Joseph Mjadu, a respected and reasonably affluent local builder. Fikile has six children, all under 16. Nelisiwe's children have left the home, but she cares for her grandchild Ciwe (11). At the time of the first assessment in October 2006, their husband Joseph was very ill. Earlier in the year, he had developed a bladder infection, but later discovered he was infected with HIV. A group of women from the village communicate the surprise they felt when they heard the news, "He was such a nice, normal man," says one woman, "no-one would have thought he would have AIDS."

By the time of our second visit in January 2007, Joseph has passed away. With Joseph's unexpected and rapid demise, the widows' finances are in a state of disarray. Most of Joseph's estate is entailed along the male line and the house the widows now occupy belongs to Joseph's brother. There is also personal conflict between the two widows. Nelisiwe is clearly depressed. She is listless and distracted, and Fikile tells us that she has become suspicious, paranoid and irrational. The grief felt by the widows is exacerbated by the tenuous state of their finances. Nelisiwe is relatively better-off; she receives a government pension and a child-grant; but only the youngest of Fikile's children receives a grant. Nelisiwe says that as she is the eldest wife, Joseph's estate must go to her. "I am not responsible for supporting Fikile's children", Nelisiwe says.

When we return in April 2007, Fikile and her six children have left Nelisiwe's house. A theft in the household in March brought matters to a head – Nelisiwe blamed Fikile for the robbery. The situation between the two widows worsened, and Fikile was forced to leave to a neighbouring village. Fikile despairs that Nelisiwe retained all the certificates, documentation, and household implements for herself. "Now, I have no food for my children", Fikile says. "At night, I can't sleep. I feel sick and dizzy." Fikile has few options available to her and realises that the coping strategies she is able to draw on are distressingly few. "I just can't allow myself to think. Life is too hard. At night, I try to stop myself thinking".

When we return in July, Fikile's chief concerns are increasingly around maintaining her own health. She has developed a debilitating cough and also suffers from diabetes. She faces a daily struggle for food and adequate shelter. "Living in my house is like living outside," she complains. "You can't sleep, the water always comes in and the children wake up and cry." Fikile also expresses concern for her social standing, "People don't respect me for my house. They just walk through my property like it is not even there." Despite Fikile's complaints, within her new neighbourhood there is clearly considerable sympathy for her situation. Talking to Fikile's neighbours, the story of Nelisiwe's depression is well known. Her actions towards Fikile are considered reprehensible.

Three months later, Fikile is doing better. Her house is still not built, but she has managed to secure herself a sickness grant from the Department of Welfare. But times are still hard. She is using her sickness grant to pay for a traditional ceremony, in order to purify herself following the death of her husband. She is also saving up for new clothing and bedding, as the bed of her dead husband and the clothes worn during marriage to him are now considered impure. Fikile explains the necessity of such rituals for the welfare of herself and her children. "Nobody respects us here now. We are new in this place and a widow is considered unclean. What will everybody think of me?" Fikile expresses concern for her children, "Who will look after them if I get sick?" she asks. "At least I can pray that God and the ancestors will be on our side."

The story of Fikile and Nelisiwe (Box 6.1) illustrates the tenuous position held by many women whose partners have become victims of HIV and AIDS mortalities. In the wake of their husband's death, Fikile and Nelisiwe engage in a bitter struggle for supremacy within the given social hierarchies. Already stigmatized by their husband's affliction status, their finances are now threatened and unfavourable inheritance rules mean they are at risk of losing their home. As the junior wife, Fikile comes off second best. When she moves to a new locality, Fikile is preoccupied with the struggles to re-establish her social standing. She freely communicates her story to her new neighbours, who are outraged by Nelisiwe's actions. At the same time, she pays meticulous attention to societal norms. Despite her poverty, she invests considerable money in traditional ceremonies of purification. She actively solicits the support and sympathy of the community.

Social capital and social transfers of food

Quite surprisingly, there was not a significant association between the level of social capital in the household and the likelihood of the household accruing social transfers of food over the 12-month assessment period. In KwaDlangezwa and Mt. Frere, 37 % and 65 % of households with low social capital had accrued at least one food resource transfer over the one-year monitoring period, compared to almost identical proportions of 38 % and 66 % for households with high social capital. In Nkandla, slightly higher proportions of households with low social capital had accrued donated food(s) (46 % versus 37 % for high social capital households), but these proportional differences were not statistically significant. This finding is triangulated by a comparison of the mean social capital scores of households with and without one or more donated food(s) in their dietary recalls (Table 6.3), which shows that social capital scores were similar for households with or without donated food(s). This was true not only for the aggregate social capital score, but also the mean responses of each individual item in the

disaggregated index. Categorical tests of association (not shown here) which compared incidence of donated food with positive or negative responses for each item in the social capital index failed to yield significant χ^2 test statistics for any of the response items. Finally, recourse on neighbours for donations of food was not a coping strategy that was cited with high regularity by households with either low or high social capital (Table 6.2, CSI response item 10).

Household socio-economic status and social transfers of food

Indicators of household wealth were significantly associated with the incidence of food transfer(s) in KwaDlangezwa and Mt. Frere (Table 6.4). In KwaDlangezwa, households with donated foods had significantly higher mean monthly earnings of R913 ± 1394, as opposed to R2070 ± 3254 for households without donated foods. In Mt. Frere, total earned monthly income was not significantly different, but income per capita was significantly higher in households without donated foods. Households with donated foods in Mt. Frere also had significantly higher numbers of unemployed adults. In Nkandla there was a trend towards households with social transfers of foods having lower monthly incomes, but this was not statistically significant.

Household food security status and social transfers of food

Although on the whole households with donated foods were poorer than households without donated foods (Table 6.4), it was only in KwaDlangezwa and Nkandla that presence of donated foods was significantly associated with higher scores for food insecurity indicators. The association between experience of food insecurity and donated foods was strongest in KwaDlangezwa (Table 6.5). Households in KwaDlangezwa with donated foods had higher mean frequency of limiting portion sizes and eating embarrassing or limited varieties of foods. In terms of food resource augmentation strategies, the only resource augmentation coping strategy significantly higher in households with donated foods was, as we would expect, the reported frequency of borrowing of foods from neighbours. In Nkandla, the food resource-restriction coping strategies associated with food transfers indicated more severe hunger patterns than in KwaDlangezwa. In Nkandla, households with donated foods had a higher mean frequency of having no food at all in the household and also reported restricting their portion sizes due to lack of food. Borrowing of foods from neighbours was also cited with greater regularity. In all three sites, numbers of cultivated foods in the household's dietary recall were higher in households with donated foods, but this trend was only statistically significant in KwaDlangezwa and Mt. Frere.

Table 6.3. Mean responses in each individual item category of the Social Capital Index, given presence or absence of donated food(s) in the household's 48 hr dietary recall over four assessments, at 3-monthly intervals. Response categories were 1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree. Mean responses are given with response categories treated as continuous variables, but p-values based on χ^2 test statistic for ordinal data.

Social capital index item (response 0–4)	KwaDlangezwa					Nkandla					Mt. Frere				
	No donated food (n=61)		Donated food(s) (n=41)			No donated food (n=51)		Donated food(s) (n=46)			No donated food (n=60)		Donated food(s) (n=48)		
	Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev	
1. Neighbours helpful	3.1	0.5	2.9	0.8	NS	3.3	0.7	3.5	0.6	NS	3.3	0.8	3.3	0.8	NS
2. Neighbourhood close-knit	3.3	0.7	3.3	0.6	NS	3.6	0.5	3.6	0.5	NS	3.3	0.6	3.4	0.7	NS
3. Can borrow R50	2.8	0.7	2.8	0.9	NS	2.9	0.8	2.8	0.7	NS	3	0.9	3	0.9	NS
4. People get on well	3	0.8	3	0.8	NS	2.1	0.9	2.1	0.9	NS	3.4	0.6	3.3	0.9	NS
5. People can be trusted	2.8	0.7	2.8	0.6	NS	2.9	0.8	3.1	0.7	NS	3.1	0.9	2.9	0.7	NS
6. Neighbours assist if sick	2.8	0.6	3	0.6	NS	2.9	0.9	2.9	0.9	NS	2.8	1	2.9	0.9	NS
7. Same beliefs, culture	1.6	1.1	1.8	1.2	NS	2.2	0.8	2.3	0.7	NS	2.3	0.9	2.3	0.9	NS
Total Social Capital (0–28)	19.4	3.4	19.6	3.7	NS	20.1	2.7	20.1	2.2	NS	21.3	3.3	21	3.9	NS
8. No. of years in house	44.6	21.6	45.6	22.6	NS	28.1	22.6	31.3	25.1	NS	22.9	13.6	22.2	12.3	NS
9. No. of years in village	49.3	28.8	52.7	23.5	NS	39.2	22.9	45.6	27.2	NS	28.2	19	27	14	NS
10. Member of organisation	0.1	0.3	0.1	0.3	NS	0.1	0.2	0.1	0.3	NS	0.2	0.4	0.2	0.4	NS

Table 6.4. Mean values for household socio-economic variables in each site, given presence or absence of donated food(s) in the household's 48 hr dietary recall.

	KwaDlangezwa					Nkandla					Mt. Frere				
	No donated food (n=61)		Donated food(s) (n=41)			No donated food (n=51)		Donated food(s) (n=46)			No donated food (n=60)		Donated food(s) (n=48)		
	Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev	
Number adult females	2	1.3	1.9	1.2	NS	2.5	1.7	2.1	1.3	NS	1.3	1	1.6	0.9	NS
Number of adult males	1.6	1.3	1.6	1.3	NS	1.5	1.3	1.7	1.2	NS	0.8	1.1	1	0.9	NS
Number of people 18 and over	3.6	1.8	3.3	1.8	NS	3.7	2.2	3.8	1.6	NS	1.9	1.3	2.6	1.5	**
Ratio children:adults	1.2	1	1.6	1.5	NS	1.2	0.9	1.2	1.4	NS	1.9	2.8	1.4	1.2	NS
Size of HH	7.4	3.6	7.2	2.9	NS	7.8	4.8	7.7	3.6	NS	4.6	3.2	5.7	3.1	NS
Average adult education level	3.1	0.9	3.2	1.1	NS	3.1	1	3.1	0.8	NS	3.1	0.9	3.4	1.1	NS
PCA weighted wealth proxies	0.8	0.2	1.3	0.2	NS	0.7	0.2	0.7	0.1	NS	0.8	0.2	0.9	0.2	NS
Weighted sum of livestock	0.6	1.8	0.2	0.6	NS	5	8.3	3	4.7	NS	2.5	4.8	2.6	5.1	NS
Earned monthly income	1,890	2,942	948	1,418	*	1,301	2,157	811	1,098	NS	1,622	3,548	1,241	2,355	NS
Welfare grant monthly income	1,085	646	892	721	NS	1,040	876	977	810	NS	924	760	1,009	793	NS
Total monthly income	2,976	2,973	1,841	1,496	**	2,342	2,514	1,789	1,406	NS	2,546	3,638	2,254	2,291	NS
Per capital income	463	530	300	319	*	348	406	259	217	NS	742	1022	617	873	*
Employed adults	1.3	1.3	0.8	0.8	*	0.8	0.8	0.8	0.8	NS	0.9	1.1	0.7	0.8	NS
Ratio employed: unemployed	0.4	0.7	0.2	0.2	NS	0.3	0.4	0.5	0.8	NS	0.4	0.1	0.4	0.1	NS
Age HHH	60.2	15.3	53.5	16.1	*	56.4	15.4	60.2	15.4	NS	56.6	15.5	54.3	14.5	NS

Table 6.5. Mean values for household food security indicators in each site, given presence or absence of donated food(s) in 48 hr dietary recall

	KwaDlangezwa					Nkandla					Mt. Frere				
	No donated food (n=61)		Donated food(s) (n=41)			No donated food (n=51)		Donated food(s) (n=46)			No donated food (n=60)		Donated food(s) (n=48)		
	Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev		Mean	S.Dev	Mean	S.Dev	
1. Worry over food	1.8	0.5	2.0	0.4	NS	1.6	0.5	1.6	0.4	NS	0.8	0.7	1.0	0.7	NS
2. Eating non-preferred food	1.9	0.6	2.2	0.4	NS	1.7	0.4	1.7	0.4	NS	0.8	0.6	0.8	0.6	NS
3. Limited food variety	1.9	0.5	2.1	0.4	**	1.6	0.4	1.8	0.5	NS	0.9	0.6	0.9	0.6	NS
4. Eating embarrassing foods	1.9	0.4	2.1	0.4	**	1.5	0.5	1.7	0.4	NS	0.9	0.6	0.8	0.6	NS
5. Smaller portions than needed	1.4	0.7	1.8	0.6	**	1.0	0.6	1.4	0.6	*	0.9	0.7	0.8	0.7	NS
6. Fewer meals in the day	1.5	0.7	1.7	0.6	NS	1.0	0.8	1.2	0.7	NS	0.3	0.5	0.2	0.4	NS
7. No food at all	1.0	0.7	1.2	0.7	NS	0.7	0.6	1.0	0.6	*	0.4	0.5	0.4	0.4	NS
8. Go to sleep hungry	0.5	0.5	0.8	0.6	*	0.5	0.6	0.7	0.6	NS	0.4	0.6	0.3	0.4	NS
9. Doesn't eat all day	0.4	0.4	0.7	0.6	*	0.4	0.5	0.5	0.6	NS	0.5	0.7	0.4	0.5	NS
Experience Resource Restrict.	12.2	3.3	14.6	3.8	**	9.8	3.4	11.5	3.1	*	5.8	4.3	5.6	3.4	NS
10. Borrow food	1.1	0.6	1.6	0.6	**	1.2	0.6	1.6	0.6	*	1.0	0.6	1.3	0.5	*
11. Sell livestock for food	0.2	0.4	0.2	0.3	NS	0.3	0.4	0.5	0.5	NS	0.2	0.3	0.2	0.5	NS
12, Buy food on credit	0.6	0.6	0.6	0.6	NS	0.4	0.4	0.7	0.6	NS	0.8	0.8	0.7	0.6	NS
13. Gather imifino	1.5	0.5	1.8	0.5	NS	1.1	0.5	1.0	0.5	NS	1.3	0.5	1.3	0.5	NS
14. Hunt for food	0.1	0.2	0.1	0.2	NS	0.1	0.2	0.2	0.4	NS	0.3	0.5	0.3	0.4	NS
15. Harvest immature crops	0.3	0.4	0.4	0.4	NS	0.1	0.2	0.3	0.4	NS	0.5	0.6	0.4	0.4	NS
16. Work for food	0.2	0.4	0.3	0.4	NS	0.1	0.3	0.3	0.5	NS	0.4	0.4	0.3	0.4	NS
Experience Resource Aug.	4.0	1.9	4.8	1.6	**	3.3	1.2	4.5	1.8	**	4.3	2.3	4.5	1.7	NS
Total Coping Strategy Index	16.2	4.5	19.4	4.7	**	13.1	4.2	16.0	4.5	**	10.1	6.1	10.1	4.5	NS
Ave. 48hr HDDS	8.7	1.4	8.1	1.3	NS	7.9	1.6	7.5	1.3	NS	9.2	1.7	9.7	1.9	NS
Ave. 48hr wild food groups***	0.4	0.3	0.5	0.4	NS	0.2	0.3	0.3	0.4	NS	0.2	0.3	0.1	0.2	NS
Ave 48hr cult. food groups ***	0.3	0.4	0.4	0.5	NS	0.2	0.4	0.3	0.5	NS	0.8	0.8	0.9	0.8	*
Ave. 48hr. purch. food groups***	8.0	1.4	6.9	1.6	**	7.6	1.6	6.3	1.7	**	8.5	1.7	8.4	1.9	NS

***Continuous mean values. Significance based on χ^2 test statistic given proportion of households with/without donated foods given presence of wild, cultivated or purchased foods.

Household HIV and AIDS status and social transfers of food

The total number of HIV and AIDS proxies accrued by a household did not significantly affect the likelihood of a household accruing a donated food. In all three sites, mean numbers of HIV and AIDS proxies accumulated in households with donated food(s) were not significantly different to mean numbers of HIV and AIDS proxies accumulated in households without donated foods. The frequency distributions of donated foods amongst non-afflicted, borderline and afflicted households were also very similar (χ^2=1.96, df=2, p=0.375).

In addition to analyses conducted on aggregated HIV and AIDS proxy indices, each individual HIV and AIDS proxy was tested for evidence of a significant association with the presence of donated food(s). In both Nkandla and Mt. Frere, no single HIV and AIDS proxy was significantly associated with the incidence of social food transfers. However, in KwaDlangezwa, households with chronic illness (18–64 yrs) and chronic illness with free treatment (0–59 and 18–64 yrs) were more likely to have donated foods (Table 6.6). Incidence of CI (0–59 yrs) with free treatment significantly increased the odds of having a donated food by 185 % (p=0.012, OR= 2.85 [1.26-6.23]).

Table 6.6. The results of tests of association between incidence of various HIV and AIDS proxy variables with presence of donated food(s) in the household's dietary recalls. NS= Pearson's χ^2 test statistic is not significant, *p<0.05.

	Kwa.Dl.	Nkandla	Mt. Frere	All Sites
Incidence of CI in 0–59 yrs	NS	NS	NS	NS
Incidence of CI in 18–64 yrs	*	NS	NS	*
Incidence of CI in 0–59 yrs receiving FT	*	NS	NS	NS
Incidence of CI in 18–64 yrs receiving FT	*	NS	NS	NS
Incidence of death(s) in 0–59 yrs	NS	NS	NS	NS
Incidence of death(s) in 18–64 yrs	NS	NS	NS	NS
Incidence of death(s) in 0–59 yrs with CI	NS	NS	NS	NS
Incidence of death(s) in 18–64 yrs with CI	NS	NS	NS	NS
Incidence of double orphan(s)	NS	NS	NS	NS
Incidence of maternal orphan(s)	NS	NS	NS	NS
Incidence of paternal orphan(s)	NS	NS	NS	NS
Female HH head	NS	NS	NS	NS

Binary logistic regressions were used in order to explore the relationship between chronic illness and likelihood of a household having donated food(s) in KwaDlangezwa. As with the earlier analyses performed on the Mt. Frere data, simple incidence of chronic illness (rather than the summed product of frequency and intensity) had the greatest predictive power on the odds of having a donated food. Similarly, none of the covariates included in either mixed or bi-variate models negated the significance of chronic illness on likelihood of a household accruing donated food(s). However, it is notable that when food security status of the household (as reflected by the CSI) was included as a covariate in mixed logistic regression models, presence of chronic illness became insignificant. That is, if CSI scores were held constant across households, the predictive power attributable to presence of chronic illness on likelihood of a household accruing a donated food would be insignificant. This suggests that households with chronic illness are intensifying their employment of one or more of the coping strategies comprising the CSI. Additional analyses performed on the disaggregated CSI item responses found that households with chronic illness had significantly higher mean response frequencies than households without chronic illness for two of the coping strategies in the CSI. These were the restriction of portion sizes (CSI item 5, $t=2.64$, $df=103$, $p<0.01$) and, as would be expected, the borrowing of food from neighbours (CSI item 10, $t=2.34$, $df=103$, $p=0.02$). Amongst households with chronic illness, those with donated foods were also more likely to be in the lower income category (Table 6.10).

Incidence of donated food is a useful unit of analysis for the identification of overall trends, but it is also possible to order households according to the total number of donated foods accrued by households over the annual monitoring period. This comparison was performed using the data from KwaDlangezwa, as KwaDlangezwa was the only site where HIV and AIDS proxies were significantly associated with incidence of donated food (Table 6.7). Some of the key attributes of the ten households with the highest number of donated foods accrued over the annual assessment period in KwaDlangezwa are summarized below (Table 6.7).

Table 6.7. Some key attributes of the ten households with the highest number of donated foods accrued over the annual assessment period in KwaDlangezwa.

	Mortality and Morbidity		Donated Foods			Socio-economic		Orphans		
HH ref.	Death (18–64)	CI (18–64)	Sum donated [a]	Mean % donated groups per assessment	Mean donated [b]	Income [c]	HH size	Pat. Orphan(s)	Dbl. Orphan(s)	Mat. Orphan(s)
	Yes	No	3	11.1	0.75	Low	5	No	Yes	Yes
	No	Yes	3	14.3	0.75	Low	1	Yes	Yes	No
	No	Yes	4	12.9	1	Low	7	Yes	Yes	No
	Yes	Yes	4	18.2	1	Low	10	Yes	No	No
	No	Yes	5	13.5	1.25	High	12	Yes	No	Yes
	No	Yes	5	14.3	1.25	Low	8	Yes	No	No
*	No	Yes	6	20.8	1.75	Low	5	No	No	Yes
**	No	Yes	6	22.2	1.5	Low	5	Yes	No	Yes
	Yes	Yes	6	25.0	1.5	Low	9	No	No	Yes
***	No	Yes	7	28.0	1.75	Low	8	Yes	No	Yes

[a] The total number of donated food groups accrued over 1 year assessment period.

[b] The mean number of donated food groups accrued over 1 year assessment period.

[c] Above or below the site median of R1700 per month.

* Household of Asmina, profile 1

** Household of Themba, profile 2

*** Household of S'bongile profile 3

As we can see from Table 6.7, nine out of the ten highest-scoring households had at least one person with chronic illness. This evidence, combined with overall the data on donated food incidence indicates that chronic illness is closely associated with both incidence and quantity of food transfers. What factors were driving the high intensity of food transfers in the households listed in Table 6.7? These complex issues are best expressed through qualitative means. In the section that follows, three case studies that have been taken from interviews conducted with household informants over the annual assessment period and are used to illustrate the dynamics underpinning food transfers, social capital and chronic illness in KwaDlangezwa. The three households profiled were chosen from amongst the households most reliant on donated foods throughout the assessment period, and are marked by * in Table 6.7.

Asmina

When we first meet Asmina (44) in October 2006, she is living in a small, one-bed roomed house with her son (18), daughter (20) and infant grandchild. Her husband is in Durban. Asmina is very ill, complaining of a sick headache and bladder infections. At this stage, however, there are no donated foods in the household's dietary recall. Asmina tells us she is "getting by" on the money she earns working for a local farmer, cutting sugar cane.

We return for the second assessment in January 2007. Asmina now tells us that her husband Mandla has come home, but he is very sick. She tells us that she thinks he might have AIDS. Her suspicions are not ungrounded: the woman he lived with in Durban admitted to being infected with HIV and Asmina now fears for her own health. Since her husband has returned she has been feeling worse and her headaches and bladder infection have returned. Asmina is under considerable strain. She says that Mandla is sick and completely reliant on her. She is concerned, as she is the only breadwinner in the family. She tells us she has been offered a new job cutting sugar-cane on the plot of a neighbour but she is concerned she is too ill to do the work. "I will go to the clinic myself soon", she says.

In April 2007, Asmina is looking very thin. Mandla is still not working, but Asmina says that when she is well enough, she is still able to get small jobs. Asmina explains, "It would be much easier if my husband could get a sickness grant, but this is so difficult because there is no money to run up and down to the welfare department, and get letters from doctors."

Asmina is now relying almost entirely on donated food. During this assessment, the cooking oil and the maize meal she had eaten the night before had been donated from a neighbour. The meal was frugally dressed with spinach collected from Asmina's garden. After the assessment, we go across the road to speak to the neighbour who donated the food. The neighbour talks to use readily; Asmina is clearly well liked. She is considered a very hard worker and is admired for her tenacity. Her children are well brought-up. We are told approvingly that her teenage son Lamulani is known to have been going around the village, trying to get jobs from people to get some "pocket money" to help his mother. In contrast, the neighbour has few good words to say about her husband. "Mandla used to stay in Durban away from her for months, " she explains. "He was never a good husband and was not looking after her. He only comes home now that he sees he is so sick." The neighbour has few doubts as to the cause of his condition, "He denies HIV, but I do not believe it. Everyone knows he was with another woman who is infected by HIV and now he has lost a lot of weight and is sick." In the face of her husband's bad behaviour, Asmina has earned the respect of the community. Her demeanour of patient forbearance amazes her admiring

neighbour, who muses that "despite what he has done, Asmina still speaks well of him. It is as if she has no grudge". As we leave the neighbour's house, we are introduced to another woman who lives nearby. She says she knows Asmina well. She shakes her head when Asmina is mentioned. "It is sad," she says. "Asmina is not looking as fresh as she was before. She is not the same Asmina we knew. I try to help her when I can." We ask how she helps Asmina and the neighbour tells us she has a sugar-cane field of her own. When that needs tending, she offers Asmina the work, "I try to find her odd jobs when I can. I know life is hard for her."

**

Themba

Themba (43) is a widow who lives alone with her four daughters. For many years, her children stayed with their paternal aunt in Durban, where they were being schooled. When her husband died in 2003, Themba explains how " My husband's sister arrived one day and brought with her the children for me to look after." Since then, Themba struggles to support her children, "The children are young to be left alone, and I have to rely on a neighbour to watch them when I go to work. Otherwise we must survive on just two child grants."

In addition to being a working mother and sole breadwinner, Themba is burdened by poor health. She describes how this affects her ability to work and provide for her family, "Life is hard for me, but I get by. My chest becomes pained and I feel weak. It is difficult to keep your strength. Sometimes, we go for a few days without food. This is usually when I get sick, but when I am better I go out again to look for a few days work." Themba will do any job she can: "I sometimes build houses for people using cement and stones or I get work in the sugar-cane fields."

At the time of the first assessment in October 2006, Themba's situation is made worse by the fact that she is squatting on a small piece of land adjoining a relative's house. This abode is unsettled and she complains that she now spends more on food than she is accustomed to, as she has nowhere to plant a vegetable garden. Themba explains how she came to be without a home of her own, "When I was a young girl growing up here, one of my uncles passed away and his children "sold" his land to newcomers. This caused great upset in my family, as no-one is allowed to sell our tribal land. In this way, I lost my birthright and these impostors pushed me off our land". Due to her poor health and impoverishment, for the first two assessments in October 2006 and January 2007, Themba is relying almost entirely on

donations of maize and occasional gifts of vegetables from the relative whose land she is squatting on, as well as a sympathetic neighbour. Apparently, the community shows considerable forbearance towards her. Despite her difficult situation, Themba says that she has strong community ties. She grew up in KwaDlandezwa, and is on good terms with the oldest and most influential families in the village.

By April 2007, things are looking up for Themba. Her standing in the community has been important for her survival and during this time of conflict it has provided her with a distinct advantage. "The Nduna and the community came to my defence over the land issue," she explains. "They looked for receipts and proof of sale. The Elders thoroughly researched the claim. The community stood up for me and I won the case." Her triumph secures her a home; "The intruders moved away a month ago, and now I have land rights and may develop the land." But the ordeal has not been without certain social costs. Themba explains that, "Those people are still in the area. There is great tension between us. They make my life difficult." Despite this, Themba is resilient. "I have the community on my side and I get on well with my new neighbours. They know I was in the right, so that at least is a comfort."

**

S'bongile

S'bongile (52) lives with her six children and three grandchildren in a derelict house at the bottom of her older sister's property. S'bongile grew up in the village, but only recently set-up residence in the village when her elderly mother died and the family fell on hard times due to the loss of revenue from her pension. S'bongile explains that they moved there in search of work and she is grateful that her sister allows them to stay on her property. Her children are all in their 20s and early 30s and desperately looking for work. S'bongile explains that the situation is exacerbated by her own chronic illness. She has suffered from a stroke and her eye-sight is very poor. This makes it impossible for her to work in her garden or search for work.

S'bongile relies heavily on her sister and neighbours for support, especially donations of food. She illustrates this point with a poignant story, "The other morning, my grandchild (7) started crying as he was getting ready for school. He said he refused to go because he said he would be hungry at school. We didn't know how to comfort him, as we had no food for him. So we went to the neighbours and borrowed 50 cents, so the child would take it and buy some chips and go to school."

Such heavy reliance on social networks is not without its costs. S'bongile is pained by her inability to fulfil local norms of social reciprocity. She illustrates her predicament by explaining her social impotence given a recent family tragedy, "My eldest daughter passed away last November (2006). My daughter wanted the children to come to me after she died, but I had to refuse them as I cannot afford to look after them. Now, her five children are on their own there. There are some teenagers but there are also some smaller ones. Every time I think about them – about how they are eating and how they are getting on – I worry. I have heard that the one little girl, Gabazile, is sick with flu that has gone on for a whole week now. I thought to go and visit them, but to go there and visit them empty-handed is not easy for me. I would rather not go at all, than go but be able to do nothing."

When we return to S'bongile on the final assessment in October 2007, the family's situation has improved financially. S'bongile has managed to secure a sickness disability grant and is receiving medical treatment for her chronic illness. She has also found temporary work in road-maintenance and her son Mponisa is employed cutting sugar cane. But S'bongile's social networks have taken strain. She has been in conflict with her brother-in-law's family over her right to be staying on her property. Her sister's husband has told them they must move out to another home on an adjoining property. The house, she complains, is small and the mud walls have been recently damaged by the rain. S'bongile suggests that her relatives are "tired of me" and jokes that they have been "waiting for me to pick myself up, so they can have an excuse to chase me away."

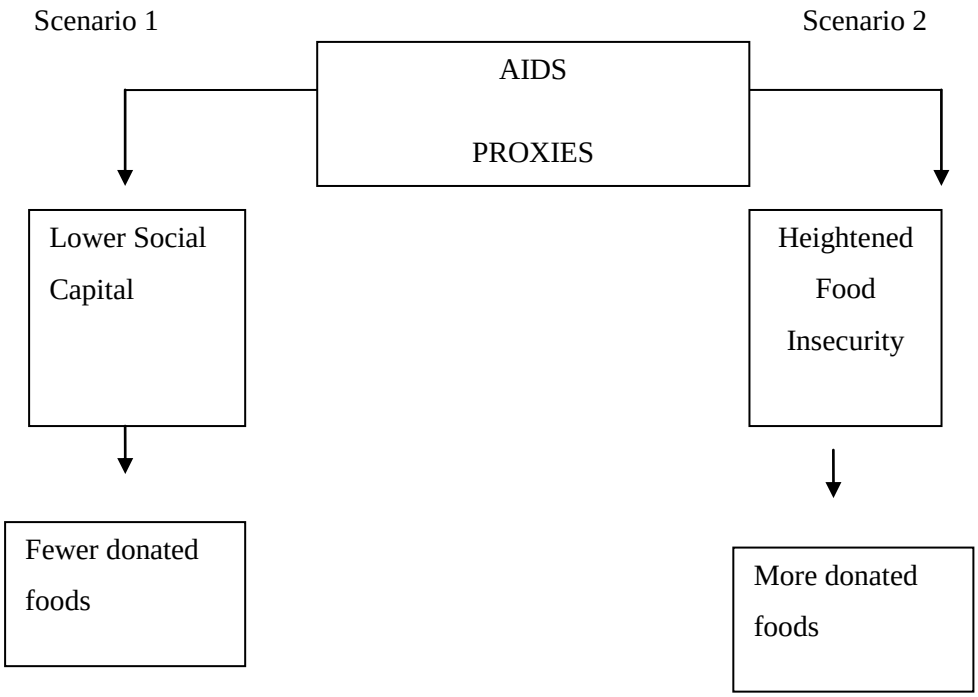
***

The three profiles above illustrate the contexts which both necessitate, and facilitate, above-average levels of food transfers in KwaDlangezwa. Each of the three women profiled above is severely compromised by a combination of poverty and vulnerability due to chronic illness. As they draw upon considerable quantities of donated food to tide them over during difficult times, they fully realise that social transfers are best extracted when there is at least the promise of future reciprocation. All of these women are thus caught between the need to exploit and the need to maintain their social capital. This process of social capital maintenance would be most easily facilitated through the reciprocal exchange of cash or commodities with a cash-equivalent value. For the very poor, however, there are ways to maintain social capital even in the absence of sufficient financial capital. Themba relies on her historical connections with influential families. Her reliance on her neighbours for food is transitional, as she slowly uses her connections to regain her property. Asmina relies on the poignancy of her position; she is the epitome of the gendered injustices of HIV and AIDS and is a living example of the dangers of infection so many women in the village are also facing.

As a result, she has the support and sympathy of her peers. S'bongile, in a state of desperate poverty, actively moves to the village where she knows she has strong social ties in an effort to derive food and shelter. However, she is forced by her poverty to push her benefits too far. Her own social standing suffers as a result. She is unable to fulfil norms of social reciprocity. As soon as her situation improves, she is driven from her home by the very relatives who originally protected her.

DISCUSSION

Current perspectives on the relationship between HIV and AIDS, food security and social capital suggest that the impact of HIV and AIDS on social transfers of food could potentially follow two alternative scenarios (Figure 6.1).



.

Figure 6.1. Two possible scenarios of how the presence of HIV and AIDS proxies will interact with social capital and household food security, and impact on the likelihood of a household receiving food transfers.

In the first scenario, HIV and AIDS has an erosive effect on social capital (Booysen 2003; Drinkwater 2003; Drimie and Gandure 2005; Thomas 2006). Lower social capital is in turn associated with fewer social transfers of food (Martin *et al.* 2004; Gertler *et al.* 2006), which anticipates that households with HIV and AIDS proxies will have fewer food transfers. In the second scenario, households with HIV and AIDS proxies have higher food insecurity (De Waal and Whiteside 2003; SADC FANR VAC 2003), which would be associated with greater use of transferred foods (Chung *et al.* 1997b; Maxwell *et al.* 2003).

This study failed to find any evidence to support the sequence of events suggested in scenario 1 (Figure 6.1). No association was found between level of social capital and incidence or intensity of food transfers accrued by the household. These findings are contrary to the hypothesis that social capital would facilitate heightened food transfers (Martin *et al.* 2004; Gertler *et al.* 2006). Moreover, there are insufficient grounds to accept the hypothesis that HIV and AIDS proxies are associated with either lower social capital or lower incidence of transferred foods. Within the context of this study, this is hardly surprising: households with high social capital were found to be both wealthier and more food secure. It is thus understandable that they would have less need, and thus lower incidence, of food transfers.

In contrast, this study did find evidence to support the second scenario suggested in Figure 6.1: an HIV and AIDS-induced heightening of food insecurity, followed by an increase in the incidence of social transfers of food. What's more, far from AIDS-affliction uniformly diminishing social capital reserves, the evidence provided by both the qualitative and quantitative data suggests that households afflicted by HIV and AIDS proxies actively (and often successfully) work to build and enhance their social capital standing, despite heightened poverty and vulnerability. This notion has been endorsed by du Toit *et al.* (2007), whose qualitative research exploring social capital dynamics in the Mt. Frere region reflected similar trends, with the researchers noting that AIDS mortality often works as a vehicle through which social capital is given "shape and form" (p. 534). Following an HIV and AIDS-related shock, extended family networks, as well as formal and informal social networks are "enlivened" through notions of relatedness and belonging, proximity, friendship and shared struggle, as a means for mitigating the regular impact of bereavement and everyday strains of coping with life under pressing conditions. Du Toit *et al.* (2007) stress that being unable to hold feasts or give gifts of food to those who are poor can undermine a household's cultural, social and symbolic standing. Du Toit *et al.*'s (2007) notion of HIV and AIDS "enlivening" social capital is useful in explaining the quantitative trends in this study, which suggested higher levels of social capital in households with paternal orphans, despite the fact that these households also have significantly higher levels of food insecurity (an attribute that is usually

associated with lower social capital). The story of Fikile and Nelisiwe (Box 6.1) suggests the tenuous socio-economic and socio-cultural position held by the mothers of paternal orphans. For women who have recently lost their partners, the elaborate funeral and death rights that follow a mortality may represent a considerable trade-off between social and financial capital, but the consequences of not sufficiently "enlivening" social capital networks following a mortality can be severe, as Fikile discovered when she was evicted from her home (Box 6.1).

Du Toit *et al.* (2007) have suggested that our definitions of social capital have been greatly limited by an inadequate examination of the role of human agency, requiring careful consideration of the discourse of entitlement and selective benefits in social exchanges. This perspective encourages us to be aware of the power relations that underlie food resource transfers and the importance of these processes in subverting and maintaining socio-structural relations during periods of heightened tension (Rangasami 1985; Pottier 1999). The importance of incorporating an appreciation of the human agency embedded in social exchanges was apparent in this study, which had the benefit of being able to triangulate social capital index scores with a simultaneous measure of social exchanges over an extended period. The disparity seen in these two indices suggests that social capital and social transfers should be carefully defined and differentiated in research and analysis, as social capital indices may not always be an accurate gauge of the social transfers taking place in the household. Factors such as the degree of long-term residence in a community, belonging to civic organisations and having a prosperous and extended family, may more aptly describe the social capital reserves of a household: the extent to which the household senses it would be able to draw on social networks for assistance if a period of crisis were to arise. Given the reciprocal nature of these networks, wealthier households are seen to have higher reserves of social capital, both because they are more likely to be able to offer reciprocation and because they are less likely to be over-exploiting such networks already. Recent analysis of four-year panel data from South Africa has corroborated this position. Adato *et al.* (2006) have found that stable, wealthier households have higher levels of measurable social capital than poor households.

Although wealthier households may have higher social capital reserves and hence higher social capital indices, this does not necessarily mean that these households are benefiting from more social transfers. This has been endorsed by Gertler *et al.* (2006), who have recently found that households with high social capital indices do not appear to be deriving any measurable form of benefit from their position, as there is little evidence that social capital has an ameliorating effect on health shocks. Gertler *et al.* (2006) suggest that having greater measurable evidence of social capital reserves and making greater use of social capital

transfers, are not necessarily the same thing. In this chapter, we found evidence that although social capital levels were higher in wealthier households, social transfers, as evidenced by transferred food, were more likely to be drawn upon by poorer households and households afflicted by chronic illness. The study suggests that, unlike social capital "reserves", which are tied to inherent economic determinants that may be difficult for social actors to control, social transfers may be more fluid in nature and more readily realized through human agency. Thus, Asmina (case study 1) was able to "enliven" her social capital in the face of extreme poverty and vulnerability, through skilfully playing the poignancy of her position against her personal attributes of tenacity, determination and human agency. Themba (case study 2) was adept at exploiting local discourses of entitlement and utilized her social history for long-term security, while donations of food from neighbours offered short-term relief. Finally, S'bongile (case study 3) illustrates that, even if social capital is finally exhausted and does eventually "bottom out", human agents are often capable of timeously switching to other coping strategies while their social capital is given a chance to be replenished. In the face of poverty and severe illness, S'bongile actively, aggressively and very successfully exploited her familial ties. Although she effectively "used up" her social capital and was eventually disdained by her relatives, by this time she had secured her financial position, which then provided her with a means to replenish her social capital for future use.

By focusing on social agency, and the politics of social transfers, a far more complex picture of capital emerges. This complexity embodies what du Toit *et al.* (2007) propose are the key issues that researchers need to keep sight of - to understand what resource exchanges are occurring given the exchanges social capital makes possible, and to clarify who benefits from these resource exchanges - and conversely, who does not. By focusing on the resource exchanges, rather than merely the components of social capital indices, we are more readily able to grapple with the idea of social capital as a resource within the asset pentagon. Moreover, through doing this we realise that HIV and AIDS does not necessarily imply a bottoming out of social capital, as is often suggested by the literature. Although in the long-term, if HIV and AIDS exacerbates household poverty, HIV and AIDS may be associated with measurable decreases in the social capital indices of households. However, researchers need to be cautious as to what the measurable outcomes of social capital declines would be. If not, social capital is in danger of becoming a meaningless term, simply being used to 'mop up' all the resources not included in physical, financial, human and natural capital. By focusing directly on social transfers, the value of social interactions to social players, particularly in the wake of transformative processes such as HIV and AIDS, is more likely to become apparent.

Chapter 7. Conclusions and Policy Recommendations

A Composite View of Food Security and HIV and AIDS in the Study Sites, and the Broader South African Context

INTRODUCTION

The preceding chapters have considered the relationship between HIV and AIDS and household food security (Chapter 3), as well as the relationship between HIV and AIDS, and what been referred to in this thesis, as diverse food acquisition strategies. These diverse food acquisition strategies included the use of cultivated foods (Chapter 4), wild foods (Chapter 5) and foods acquired through social transfers (Chapter 6) in order to buffer dietary intake. This emphasis on diverse food acquisition strategies was prompted by the theoretical discourse of HIV and AIDS, which suggests that households in the context of HIV and AIDS are tend to diversity (or possibly curtail) their food acquisition strategies in order to cope with HIV and AIDS shocks.

It is evident from the preceding chapters that the relationship between HIV and AIDS, food security, and food acquisition strategies can vary widely between sites. This inter-site variability is one of the most interesting aspects of this study, given the need for studies that explore how HIV and AIDS responses can vary at the village, or community level (Mutangadura *et al.* 1999; White and Robinson 2000; Gillespie *et al.* 2001; Barnett and Whiteside 2002; Bell *et al.* 2006). Hitherto, site-disaggregated analyses have been conducted within each results section, but the thematic nature of the chapters makes it difficult to envision a composite view of how the food security and acquisition strategies in each site are structured. The current chapter provides such an overview, through synthesizing key findings from the preceding chapters into a composite perspective for each site.

In addition to providing a composite view for each site, this chapter addresses the overall relevance of the study findings within the broader South African context. In the preceding chapters, a number of significant relationships between HIV and AIDS, food security and food acquisition strategies have been highlighted. Following this, it is important to consider the relevance of these relationships within the overall context of the dominant food

acquisition strategies in the study sites, and in South Africa as a whole. In other words, how significant are these (modifications in) household food acquisition strategies when they are considered in the context of the dominant drivers and food security and acquisition in the study sites? Through addressing this question, the relevance of the study within the context of South African food security policy and practice can be assessed. Specifically, recommendations can be formulated in terms of the anticipated impact of HIV and AIDS on household food security responses, the significance of this impact in terms of overall household, community and national-level food security, and the relevance of these findings for food security monitoring and interventions in South Africa. These issues are considered in the final section of this chapter.

A COMPOSITE VIEW OF FOOD SECUIRTY RESPONSES IN EACH SITE

KwaDlangezwa

KwaDlangezwa was the most urbanised of all sites, forming an expansive, semi-rural sprawl appended to the nearby industrial centres. Households were easily formed and readily broken up in KwaDlangezwa. Perhaps because of this, length of residence was an important factor in determining the level of household social capital (Table 6.1). KwaDlangezwa also demonstrated the widest variation in wealth and income-status between households, with households ranging from a relatively political and social elite, to households whose status could be described as near-destitute. Overall, the health-status of residents was also not good in KwaDlangezwa, and the site had the highest levels of chronic illness (Figure 2.9). KwaDlangezwa also had the highest experience of food insecurity (CSI) of all the sites. It is further notable that KwaDlangezwa was the only site which showed a strong (statistically significant) relationship between household income and HDDS (Figure 3.3), whereas the CSI was not statistically significant with household income at the site level (Figure 3.4).

There was no significant relationship between household income and HIV and AIDS status in KwaDlangezwa. Given this, it is perhaps not surprising that HDDS was not significantly lower in households with HIV and AIDS proxies, as the HDDS in KwaDlangezwa was primarily associated with household income (Figure 3.3). However, the CSI (which was

independent of household income in KwaDlangezwa, Figure 3.4) was significantly higher in KwaDlangezwa households with worsening chronic illness (Figure 3.8) and recent mortality (Figure 3.11). Notably, while households with recent mortality did not have on average lower incomes than households without mortality (Table 3.4), regressions that controlled for the presence of mortality in the relationship between CSI and household income (Figure 3.15) showed that income may have anameliorative effect on the degree of food security experienced in mortality-afflicted households. Thus, although households with mortality are on average more food insecure, as income increases, they tended to cope better.

In contrast, households which reported orphans without a grant appeared more vulnerable to experience of food insecurity even in the presence of a higher household income (Figure 3.14). The qualitative evidence supported the view that orphan-fostering (particularly paternal orphan) households were a particularly vulnerable group in KwaDlangezwa. There was, however, statistically significant evidence that households with paternal orphans have higher levels of social capital, specifically in terms of being able to borrow money from neighbours (Chapter 6, p.160). For these households, there was evidence from the qualitative data that these households actively built or maintained their levels of social capital (Box 6.1). But this maintenance process was not necessary to simply acquire food transfers, but also cash, access to housing, land and socio-psychological support.

Finally, households with chronic illness in KwaDlangezwa appeared particularly prone to heightened CSI scores. A worsening chronic illness condition over 12-months very strongly demonstrated this trend. Close analysis of the coping strategies employed in KwaDlangezwa suggest that these households are restricting food quantity, rather than food diversity (HDDS). Most of the association of chronic illness with CSI was attributable to the CSI items relating to restriction of portion sizes and borrowing food from neighbours (Chapter 6, p.163). Analysis of the number of donated foods in the household diet also showed that in KwaDlangezwa, households with chronic illness are also more likely to have food from neighbours (Table 6.6 and 6.7). There was also evidence that households with chronic illness in KwaDlangezwa were investing more heavily in cultivation, as these households had a higher proportion of foods from cultivated sources (5.1 % ± 1.4 % versus 2.6 % ± 1.7 %). This effect was apparently independent of household income, but was mediated by whether the household was receiving treatment for the chronic illness or not (Chapter 4, Model 4).

Nkandla

Whereas KwaDlangezwa was characterized by heterogeneity in household demographic, food security and wealth status, Nkandla was marked for its conspicuous homogeneity in household wealth and dwelling status. Most dwellings were physically very similar, settlements were dominated by closely-knit kinship groups, and the region was also relatively geographically isolated. Diets were of very poor diversity in Nkandla: there was a very low range of food-groups consumed, and a small degree of variation between households. Perhaps because of this, even very small changes in HDDS level indicated an improvement in the experience of food security of the household: of all the sites, HDDS and CSI showed the strongest correlation in Nkandla (Figure 3.6). However, it should also be noted that the study year in question fell during a time of severe rain scarcity (see Chapter 2, site descriptions), which may have negatively affected the food security status of the Nkandla community. This is one of the limitations of this study, as the ability of this study to describe food security responses under 'normal' conditions is limited.

Perhaps because of the absence of conspicuous wealth-status markers between households, it was the level of social capital in the household that had the strongest statistical association with the household's experience of food security in Nkandla (Table 6.2). Whereas household income and wealth-status were at best only weakly correlated with household food security, simple linear regressions showed that total household social capital score explained almost 25% of the variability in the household CSI scores (Chapter 6). Site-disaggregated analysis of the CSI components suggested that high CSI scores in Nkandla were associated with strategies related to portion restriction, and running out of food (that is, food quantity restriction). From this it might be inferred that households with high social capital were not necessarily eating a higher diversity of foods (HDDS), but tend to be more food secure in terms of eating adequate portions and not running out of food. This heightened food security was not, however, apparently associated with higher levels of donated foods at the household-level, although overall the total percentage of HDDS derived from donated food groups was highest in Nkandla 5.6 % (± 0.9 %) compared to 3.3 % (± 0.8 %) in KwaDlangezwa and 3.6 % (± 1.1%) in Mt. Frere.

For the most part, the quantitative survey indicators were unable to capture what high levels of social capital were defined by in Nkandla. High social capital levels were not associated

with any of the socio-economic, demographic, wealth, livestock or length of residency indicators measured in the study. Given this, it is likely that social capital in Nkandla is defined in terms of interpersonal relationships and social networks, that were not captured adequately in the quantitative indicators employed in this study. These determinants of social capital should be flagged for future (possibly qualitative research). It may be that in sites characterised by strong kinship-networks and socio-economic heterogeneity, social capital indices may be equally (if not more) useful than wealth indicators for targeting the food insecure.

Nkandla households did not demonstrate statistically significant relationships between the presence of HIV and AIDS proxies, and the level of food security (CSI and HDDS) in the household (Table 3.2). However, Nkandla households did share in common with KwaDlangezwa a tendency to intensify cultivation activities given the presence of chronic illness in the household (Chapter 4). Yet whereas in KwaDlangezwa this effect was independent of income, more detailed analyses performed on the Nkandla data (not presented in this thesis) indicated that only higher income households had significantly higher percentages of cultivated food groups in their HDDS, given the presence of chronic illness. Overall, households with the greatest percentage of cultivated food groups were high income households with chronic illness. This is interesting, because high income households in Nkandla did not tend to be the households who derived the highest proportion of food groups from subsistence cultivation. Indeed, most of the households with high income in Nkandla derived their greatest percentage of food from purchased foods. However, it appears when they are afflicted with chronic illness, high income households are more likely to fall back on cultivation. Perhaps for these reasons, the relationship between income and the CSI was found to be less significant in households with chronic illness in Nkandla. That is, relatively affluent households with chronic illness were on average more food insecure that households without chronic illness in the same income category. This is consistent with the finding that relatively affluent chronic illness-afflicted households are investing more heavily in subsistence cultivation.

Mt Frere

Of all the sites, the households in Mt. Frere had the highest dietary diversity, and were also the most food secure (Table 3.1). It Mt. Frere the relationship between the HDDS and the CSI

was also weakest (Figure 3.6), and there was also no significant association between the indicators of household food security, and household HIV and AIDS proxies. Indeed, the long-run wealth status and current earnings of the resident household members appeared to have little association with the HDDS and CSI levels in the household. Moreover, unlike Nkandla and KwaDlangezwa, Mt. Frere showed no evidence for a relationship between current household income and CSI, whether controlling for household HIV and AIDS proxies or not (Chapter 3, p. 94). Rather, in Mt. Frere, the most important determinants of household food security had less to do with the status (wealth, or health) of the *resident* household members, than the large numbers of male and female absentees from Mt. Frere households, relative to other sites (Table 2.1). At the intra-site level, the HDDS and CSI scores of the household were significantly associated with the presence or absence of adult absentees from the household (Table 3.1).

The issue of migrant remittances is an interesting one, because the need to consider a model that incorporates the linkages between rural, urban and peri-urban areas has been increasingly considered key to understanding how HIV and AIDS-linked ebbs and flows in available household capital affect national-level food security (White and Robinson 2000; Barnett and Whiteside 2002; Jayne *et al.* 2005). It is also interesting because Mt. Frere, in common with many former homeland territories in South Africa, has historically been regarded as being disadvantaged by the absence of (particularly male) labour, which is believed to curtail household agricultural productivity (Murray 1981). However, although Mt. Frere had the smallest household-sizes of all the sites, and the land was arguably the least agriculturally productive of all sites (having the lowest annual rainfall, and poor soils), Mt. Frere had the highest numbers of cultivated food groups in the HDDS. After 8 days, 9 % (± 2.5 %) of the Mt. Frere HDDS comprised cultivated food groups, compared to 4.2 % (± 1 %) for KwaDlangezwa and just 3.2 % (±1 %) for Nkandla.

Policy implications of site-specific comparisons

In the review of existing studies examining livelihoods and HIV and AIDS (Chapter 1), it was noted that local responses appear to be strongly flavoured by site-specific determinants relating to socio-economics, gender, culture and the inherent agro-ecological productivity of the land. This makes it exceedingly difficult to generalize existing research into national-level recommendations relevant to the South African context.

The site-specific comparisons compiled in the preceding section largely confirm these indications: that household food security responses to HIV and AIDS vary greatly between sites and local contexts. When compared across sites, no single household food security

indicator (HDDS or CSI) or response (coping strategy) was uniformly (in all sites) associated with the presence of HIV and AIDS proxies in the household. This finding has important implications for vulnerability targeting, which suggests that vulnerable households can be uniformly flagged on the basis of the presence or absence of HIV and AIDS variables alone (FANRPAN 2007). Overall, this study provided fresh evidence to support the suggestion (i.e. FANRPAN 2007) that the practice of targeting HIV and AIDS vulnerable groups be avoided; as there is insufficient evidence to suggest that vulnerability is necessarily synonymous with need. This suggestion is particularly important given recent suggestions by the South African FIVIMS group that presence of certain key variables related to HIV and AIDS (such as chronic illness and orphan fostering) be included as household-level food security targeting variables at the community-level (Banda and NoviAfrica 2007; Banda 2007; Department of Agriculture 2007).

THE IMPORTANCE OF DIVERSE FOOD ACQUISITION STRATEGIES TO HOUSEHOLD FOOD SECUIRTY

The site-specific overviews in the preceding section suggest that food acquisition strategies from non-purchased food sources vary considerably between sites, and also with the level of HIV and AIDS affliction. Yet while this variation may be significant at a micro (or statistical) level, the importance of these varied contributions to the broader context of dietary quality and food security in the study sites has yet to be addressed. In other words, although it may be that, for example, the level of cultivated foods in Mt. Frere diets are significantly higher relative to other sites; it is not evident whether these higher levels of cultivated crops are instrumental in elevating the levels of overall food security and dietary diversity in the site. Alternatively, it is not clear how significant the relatively high levels of wild foods in KwaDlangezwa, and donated foods in Nkandla, are given the overall the dominant food acquisition strategies of each site.

These questions were addressed in some detail in a series of separate analyses, which used ordinal logistic regressions exploring how the percentage of total foods from purchased, wild, donated and cultivated sources affects the odds of a household experiencing various food security outcomes. These analyses provided important information in their own right, but as this thesis is primarily concerned with exploring HIV and AIDS effects on household food security and acquisition strategies, these analytical procedures are not presented in detail in this thesis. However, it is useful to highlight these findings for the purpose of assessing the

significance of HIV and AIDS-related responses within the broader food security context of each site. This is done briefly in the sections which follow.

Importance of diverse food acquisition strategies to dietary diversity

In all three sites, purchased foods dominated the food groups consumed by a household over the 12-month assessment period, comprising a total of (89.1 % ± 9.0); or 88.6 % (± 8.5), 89.9 % ± (10.2) and 88.8 % of HDDS in ± (8.4) in KwaDlangezwa, Nkandla and Mt. Frere respectively. The remaining food groups were sourced from cultivated (5.6 % ± 6.8), donated (4.5 % ± 7.1) and wild sources (3.2 % ± 4.1) in varying proportions, depending on the site[2]. Thus, although Mt. Frere had the highest incidence of food groups sourced through domestic cultivation of all sites (9.25 % ± 8.3, with a median of 6.8 %), on the whole, households with high levels of cultivated food groups in their dietary recall did not have higher dietary diversity than households with low levels of cultivated food groups, in Mt. Frere or in any of the sites. On the whole, it was households with high levels of purchased foods in their dietary

[2] Note: Figures reflect incidence of a food groups from donated, cultivated and wild sources as a percentage of total HDDS after eight assessments. As a result, percentages reported do not always equal 100. This is because it was possible for a household to consume the same food type (e.g. vegetable) from varying sources (e.g. a combination of cultivated and purchased vegetables) within one assessment.

recalls that showed consistently higher levels of overall HDDS. Ordinal logistic regressions which used level of HDDS (low, medium or high) as an outcomes indicator also failed to detect a significant relationship between the summed incidence of food groups as derived from wild, cultivated and donated sources, and overall HDDS. The results of these analyses suggest that (relative to purchased foods) cultivated, donated and wild foods do not significantly improve the likelihood of a household having higher dietary diversity in any of the sites.

Importance of diverse food acquisition strategies to experience of food security

Although diverse food acquisition strategies were not significantly associated with household dietary diversity, the summed incidence of cultivated, wild and donated food groups in the dietary recall was associated with the household's experience of food security. Specifically, households with higher proportions of cultivated, wild and donated food-groups in their dietary recalls were more likely to respond positively to items in the CSI relating to eating smaller portions, skipping meals, and going to sleep hungry. Overall, the greater the evidence for diverse (that is, non-purchased) food sources in a household's diet, the greater the household's experience of food resource restriction and hunger. This suggests that these diversification practices are responses to hunger and food insecurity, rather than being used as preventative strategies.

The significance of diverse food acquisition strategies to households afflicted by HIV and AIDS

From the above, it is apparent that households with diverse food acquisition strategies are not necessarily better-off in terms of overall dietary diversity, and experience of food security. If anything, diversification is associated with a heightened experience of food insecurity in the household, which suggests that diversification is a reactive, rather than pre-emptive food security-maintenance strategy.

In HIV and AIDS discourse, food diversification strategies, such as use of wild foods, recourse on neighbours and strategies to maintain levels of subsistence agricultural productivity is commonly termed an HIV and AIDS "coping strategy". The term in itself has been around since the 1980s, but, as Rugalema (2000) noted nearly a decade ago, HIV and AIDS has given the concept of coping strategies a "new lease of life". Rugalema (2000)

cautioned commentators to recognise that the concept of coping strategies was first developed as a subset of famine theory, the basic premise of which was that coping strategies were short-term responses to crisis situations, not necessarily based on sustainable solutions (De Waal 1989). While these knee-jerk reactions may have been effective when coping with shocks like famine (which are dramatic, but transient), a number of critics have noted that the concept of coping strategy can be problematic when applied to HIV and AIDS, which has been repeatedly described as a long wave disaster with long-term effects (Sauerbarn *et al.* 1996; Rugalema 2000; Baylies 2002; De Waal and Whiteside 2003; De Waal and Tumushabe 2003). Thus, because there is no concept of recovery or returning to viability after the HIV and AIDS crisis has passed, HIV and AIDS responses are not, by definition, coping strategies (De Waal and Whiteside 2003), and for the most part, HIV and AIDS households are not coping in terms of acceptable livelihood maintenance (De Waal and Tumushabe 2003). Households may at best be "surviving", but they are not "coping" (Rugalema 2000).

This thesis indicated that on the whole, recourse on diverse food acquisition strategies are an example of reactive, short-term strategies for surviving the experience of food restriction - but not for coping with long-term food insecurity. The study indicated that, for the most part, household responses to food insecurity in the context of HIV and AIDS showed little evidence of long-term strategy, making the term coping *strategy* something of a misnomer. Indeed, given the high opportunity-costs associated with accelerated investment in diversifying some food acquisition strategies (such as subsistence agriculture and social food transfers), these strategies may actually undermine food and livelihood security in the long-term, if investments end up incurring costs that are higher relative to the benefits offered.

Clearly, the findings highlight the need to discern between coping strategies that are sustainable, and strategies that are not. This plea is certainly not novel: in an attempt to re-sensitize HIV and AIDS discourse to some of the critiques of the 'coping strategy' discourse, some commentators have suggested that notion be revised in such a way, that when speaking of household responses to HIV and AIDS we distinguish between "erosive" and "non-erosive" coping strategies (SADC FANR VAC 2003; Jooma 2005). In many ways, the findings of this thesis reinforce this plea – but with one important exception. Hitherto, most of the so-called erosive strategies that are cited in the literature are outlined using a largely common-sense approach. Strategies that would clearly have negative long-term implications for overall household or community wellbeing - such as withdrawal of children from school, or the sale of livestock or land - are commonly marked as erosive and thus to be avoided at all cost (De Waal and Whiteside 2003; SADC VANR VAC 2003; Jooma 2005; Beegle 2006). However, in this study, the coping strategies that might be regarded as erosive were not

always intuitively defined. Intensified investment in household subsistence cultivation, for example, was more evident in household afflicted with chronic illness, but the success of these strategies is very much mediated by the level of monthly earnings in the household and / or the degree of medical treatment being received. Unless this type of support is ensured, for many households investment in this form of diversification would constitute a wasted effort, or en erosive strategy. Indeed, even if these strategies proved successful for households in terms of ensuring significantly heightened proportional inputs from diverse food sources relative to the regional average, even the most successful of food-source diversifiers are still very unlikely to raise the proportion of food acquired through these means to levels that match the contribution made by purchased food sources. It is thus questionable whether these diversification strategies, even when 'successful' , should be considered as constituting viable, long-term and sustainable solutions to food insecurity at all.

These findings have potentially important implications for food security policy and planning in South Africa. The IFSS has declared its primarily objective to overcome rural food insecurity by increasing the participation of food-insecure households in productive agricultural-sector activities (Department of Agriculture 2002). However, it is notable that in the study sites, agricultural inputs from subsistence activities were, on the whole, not significantly higher than the number of food groups derived from other diverse acquisition strategies; such as use of wild foods or social food transfers. Yet while wild and donated foods are (quite justifiably) not regarded as anything more than a safety-net for periods of heightened, short-term need - and would not be seriously entertained as the basis for a viable long-term food security solution in any site - subsistence cultivation forms the cornerstone of the IFSS policy. This is despite the fact that of all the strategies for food diversification available to rural households, it is agricultural production that incurs the highest opportunity costs and has the highest margin for risk and failure. For households already made vulnerable by HIV and AIDS, the consequences of an unsuccessful attempt to invest in food security diversification may be particularly devastating. Policy makers would thus do well to thoroughly investigate the *current* importance of diverse food acquisition strategies to local livelihoods within any given context, before efforts are made to encourage households to invest more heavily in a particular diversification strategy.

Given the shortage of research as to the importance of subsistence cultivation to household food security and nutrition in South Africa (Kirsten *et al*. 1998; Van Averbeke and Khosa 2007), it is difficult to determine whether the relatively modest inputs from cultivated sources seen in this study are typical of South Africa's rural areas as a whole. It could be that some regions do derive proportions of food from diverse acquisition strategies that are significant in

terms of overall dietary composition. However, it should be noted that the study sites were specifically selected because they were seen to typify rural land-based livelihoods in South Africa. The Nkandla site in particular is a region particularly noted for its agricultural potential and extent of local reliance on land-based inputs (Cairns and Lea 1990; Kirsten *et al.* 1998; Taylor and Cairns 2001; uThungulu District Municipality 2007a).

This study is also limited in its ability to comprehensively gauge the nutritional importance cultivated inputs, due to the absence of alternate quantitative nutritional indicators administered at the household-level, such as serum measure of nutrient intake and measures of dietary adequacy. It could be that although cultivated food inputs are not (statistically) significant in terms of overall dietary diversity, they do still play an important role in ensuring nutritional adequacy of individuals and/or households. This area should certainly be flagged for future research, particularly given the importance of increased micronutrient intake to individuals with HIV (Friss 1998; Haddad and Gillespie 2001; Beisel 2002). However, it should be noted that dietary diversity is generally considered a very good proxy for nutrient adequacy, as it has been shown to perform well against benchmarks of overall dietary quality (Savy *et al.* 2005), and quantitative measures of nutrient adequacy (Ogle *et al.* 2001; Torheim *et al.* 2003; 2004; Azadbakht *et al.* 2005). For these reasons, if accelerated inputs from a diverse food acquisition strategy are not associated with overall dietary diversity, it is unlikely that importance of these inputs to overall household nutrient intake and adequacy will be significant either.

RECOMMENDATIONS FOR FOOD SECURITY TARGETING SYSTEMS

General usefulness of the HDDS to food security targeting and monitoring

Overall, this study confirmed the usefulness of dietary diversity as an indicator of community-level food security. The small degree of variation between diets at the household-level, however, meant it was unsuitable for targeting the food insecure at a household-level. This is especially the case in isolated, relatively homogenous rural areas such as Nkandla, where the degree of dietary variation between households is very low. However, in sites such as KwaDlengezwa, where the socio-economic landscape is more heterogeneous and the wealth-disparities between households are more marked, HDDS may be a more useful indicator of household-level food insecurity. For this reason, it is possible that HDDS may

have more usefulness for micro-level targeting in urban and peri-urban settings. This is consistent with studies from other developing countries, which have shown a good correlation between HDDS and overall socio-economic status of the household (Hoddinott and Yohanness 2002; Ruel 2003). For these reasons, this study overall endorses current strategic planning that proposes to drop HDDS from the proposed set of community-based food insecurity monitoring system (CBFMS), which would form sub-components of the FIVIMS for micro-level household targeting (Banda and NoviAfrica 2007; Banda 2007; Department of Agriculture 2007). However, due to the good collation of HDDS with CSI at the inter-site level, as well as its established usefulness as an indicator of overall dietary quality and quantity (Ruel 2003), it is advisable that HDDS be maintained as an indicator of regional-level food insecurity. HDDS may also have usefulness at a community-level in urban and peri-urban regions, but this suggestion needs to be validated through further empirical research.

The inability of the HDDS perform satisfactorily as a household-level food security indicator is partly attributable to the methodological limitations of the dietary recall probe, which were identified in Chapter 2. Specifically, the dietary probe excluded foods not eaten as household meals, which means that many wild food items (such as fruits, nuts and bushmeat) were excluded. The result of this is that the contribution of wild natural resources to local rural diets is likely to be systematically underestimated in any methodology that utilises household-level dietary probes. In order for this to be addressed, it is recommended that in sites where HDDS is to be employed as a measure of household food insecurity, a pilot should be used to assess the input of wild food groups into local diets. Significant groups should then be specifically included in the dietary probe.

Another potential limitation of the dietary recall instrument is that the person responsible for preparing the household meal could not realistically be expected to know what all household members in the household had eaten at all times, which again results in underestimation. This is particularly problematic in very large households, where the likelihood of underreporting is higher. This may lead in a systematic bias towards larger households showing a lower dietary diversity (and thus higher food insecurity) than is actually the case. As noted in Chapter 2, the literature is surprisingly silent on both recognising this limitation, and also advising how this issue is to be tackled (Hoddinott 2002; Food and Nutrition Technical Assistance (FANTA) 2002; Hoddinott and Yohannes 2002). Unless this issue is adequately addressed, the usefulness of a household-level dietary diversity score over the more commonly-utilised individual dietary diversity score (IDDS) (for example: Ogle *et al.* 2001; Torheim *et al.* 2003; 2004; Azadbakht *et al.* 2005; Savy *et al.* 2005) is called to question. In future, more research

which compares the correlation of various household socio-economic and food security benchmarks with both individual and household-level dietary diversity scores would be useful. It may be that, due to the smaller degree of error associated with reporting individual-level dietary intake, the IDDS of particular household members performs equally, if not superiorly to the HDDS as an indicator of household-level food security.

Usefulness of the CSI to food security targeting and monitoring

Overall, the experiential measure (CSI) showed good potential as an indicator of short-term food insecurity. The indicator was easy to administer, and process. Overall, however, the experience of resource augmentation (ERA) sub-component of the CSI did not show as much promise for identifying the food insecure as the experience of resource restriction (ERR) sub-component. This component's emphasis on coping strategies tend to have a high degree of site-specificity, and some coping strategies (such as sale of livestock) may only be accessible to those with heightened socio-economic (and food security) status. These findings are in keeping with a body of recent research which has suggested that the ERR component questions have promise of relevance across a range of developing country contexts and cultures (Coates 2004; Coates *et al.* 2006b; Frongillo *et al.* 2003; Frongillo and Nanama 2006).

The items in the ERR have been proposed as a core component of the FIVIMS CBFMS, as they are deemed suitable for micro-level household targeting (Banda 2007; Department of Agriculture 2007). While this study on the whole supports this decision, a number of important considerations need to be highlighted. Firstly, although the first four items in the ERR (relating to worry over food, and food diversity) may have relevance for food insecurity mapping at the regional-level, this study suggested that these indicators have little specificity for identifying the food insecure at the household-level. In other words, in generally very food insecure regions; dietary diversity, dietary choices and the degree of worry a household reports may not vary widely enough between households to be of use in targeting. If corroborated, the first four items of the ERR may be potentially less-useful for CBFMS than the latter ERR items. In contrast, questions relating to restrictions of food quantity provided the highest level of discernment in food-security status between households, at the site level. It is strongly advised that more research be conducted which tests the hypothesis that heightened ERR scores are associated with diminished household caloric consumption. This would be done through a series of controlled household studies, which benchmark ERR

scores with quantitative indicators such as Body Mass Index, households food stores and/or actual household caloric consumption.

Use of food security indicators to target HIV and AIDS food insecure households

From this study, there is no evidence that households with HIV and AIDS suffer from diminished household dietary diversity at either the community, or the household level. Proxy HIV and AIDS-afflicted households consumed on average the same number of food groups over a given period as afflicted households, in roughly the same proportions. For this reason, measures of individual food-group intake or aggregate scores of household dietary diversity may not be useful for detecting so-called "HIV and AIDS effects". Although extension of the recall period to weeks, or even years may prove that, over long periods of time, these differences do become significant (for example, as seen by Twine and Hunter (2008) in Limpopo), for most food security monitoring systems this would not be practical.

In this study, households afflicted with HIV and AIDS did, however, show a tendency to report a higher experience of food resource restriction relative to non-afflicted households. In Chapter 3, it was noted that this heightened experience of food security may be attributable to the so-called 'attitudinal' aspects of food insecurity, where those afflicted with misfortune have a heightened sense of depravation relative to their neighbours. It also may be, however, that HIV and AIDS-afflicted households are restricting the quantity of food consumed in the household. Given the data at hand, this study is unable to conclude with certainty whether the former, or latter explanation can account for this effect. The recommendations in the section above, which advise more targeted research into whether experiential indicators are associated with caloric intake at the household level, will be necessary to address this question with more certainty. However, the overall indications of this study have built a case for both the former and the latter case. There were consistent indications from both quantitative and qualitative sources that the sensitivity of the experiential measure to the presence of HIV and AIDS is at least partly attributable to a restriction of the quantity of food consumed by the household. However, there were also indications that HIV and AIDS-afflicted household may temper their experiential responses based on the overall context of their current situation (which is usually one of high vulnerability), rather than their actual quantitative intakes. Importantly, it should be noted that this is not necessarily a disadvantage of the experiential measures. Indeed, it may be an advantage - as mechanistic, quantitative indicators have been justly criticised in the past for failing to capture what it *means* to be food

insecure (Maxwell 1996; Coates 2004; Kennedy 2005). However, programs which rely on experiential measures to need to be aware of the possibility that so-called "AIDS effects" on food security might not be wholly comparable with more standard, quantitative food security measures.

Where to next? Priority areas for future research

The overarching importance of purchased foods to the dietary intake of households in the study regions suggests that South African commentators on the relationship between HIV and AIDS and food security have been focusing on the wrong areas. Given the lack of empirical research from South Africa, it is perhaps not surprising that South African commentators have largely modeled their analyses on the likely impacts of HIV and AIDS on rural livelihoods using the discourse from other African regions (e.g., Adams *et al.* 2002; Drimie 2003; Aliber and Drimie 2004). As a result, there has been an emphasis on describing how food security is likely to be exacerbated in South Africa's rural areas due to decreased agricultural production due to household labour deficits. This study suggests that even if there is a negative impact of HIV and AIDS on household cultivation, the magnitude of this impact is not likely to be significant when considered in light of the importance of cash-based food acquisition strategies in South Africa's rural areas.

Due to the centrality of household income to food security in South Africa's rural areas, research exploring the relationship between HIV and AIDS and food security should, in future, primarily target clarifying the impact of HIV and AIDS on household income and expenditure. For this, longitudinal studies are needed, which highlight how consumption expenditure changes over time, given the presence of HIV and AIDS. This research gap is especially pressing, given the current confusion regarding this matter between research communities. Earlier research had suggested that income and expenditure is lower on average in HIV and AIDS afflicted households, and also continues to decline over time (Bachmann and Booysen 2004). However, more recent research has indicated that income is not necessarily lower in HIV and AIDS households and does not necessarily worsen over time (Mishra *et al.* 2007a, 2007b). For South African food security monitoring and targeting, it is essential that if the "AIDS effect" on household food security is to be gauged, the manner in which HIV and AIDS effects income and expenditure over time be clarified. Following this, if indeed the relationship between HIV and AIDS and food security is found to be expressed through primarily financial means, food security monitoring systems which employed indicators that are aligned to wealth, poverty or socio-economic indicators can be reasonably assured that those made food insecure by HIV and AIDS will be adequately accounted for.

Reference List

Abel, N., Barnett, S., Bell, P., Blaikie, P., and Cross, E. (1988). The impact of AIDS on food production systems in East and Central Africa over the next 10 years: a programmatic paper. In 'The Global Impact of AIDS'. (Eds M. Carballo and J. Mann) (Adam R. Liss: New York).

Adams, W., Aliber, M., Cross, C., Drimie, S., Modisille, S., Randela, R., and Tlabela, K. (2002). 'The impact of HIV and AIDS on land issues in KwaZulu-Natal province, South Africa: case studies from Dondotha, Muden, KwaDumisa and KwaNyuswa.' (Human Sciences Research Council, Pretoria).

Adato, M., Carter, M., May, J. (2006). Exploring poverty traps and social exclusion in South Africa using qualitative and quantitative data. *Journal of Development Studies* 42: 226-247.

Alfred Nzo District Municipality (2007). 'Alfred Nzo IDP 2005/2006.' (Alfred Nzo Municipality, Available online http://www.andm.gov.za/?cat=general&pid=56. Accessed 14.05.2007).

Aliber, M., and Drimie, S. (2004). 'HIV and AIDS, land reform and land-based livelihoods in three provinces in South Africa.' A response to the RENEWAL call for proposals in southern Africa. Submitted by the Integrated Rural and Regional Development Research Programme, Human Sciences Research Council (HSRC).

Aliber, M., Tlabela, K., Drimie, S., Walker, C., and Masika, P. (2006). 'HIV and AIDS, land-based livelihoods and land reform in South Africa: Report to the International Food Policy Research Institute and the Department of Land Affairs, South Africa.' (HSRC and IFPRI, Available online at http://www.sarpn.org.za/documents/d0002154/HIV_Land_reform_IFPRI_Jan2006.pdf. Accessed 02.12.2008).

Angelsen, A., and Wunder, S. (2003). 'Exploring the forest-poverty link: key concepts, issues and research implications.' (CIFOR, Bogor).

Azadbakht, L., Mirmiran, P., and Azizi, F. (2005). Variety scores of food groups contribute to the specific nutrient adequacy of Tehranian men. *European Journal of Clinical Nutrition* 59: 1233–40.

Bachmann, M. O., and Booysen, L. R. (2003). Health and economic impact of HIV and AIDS on South African households: a cohort study. *BMC Public Health* 3: 14–36.

Bachmann, M. O., and Booysen, F. R. (2004). Relationships between HIV and AIDS, income and expenditure over time in deprived South African households. *AIDS Care* 16: 817–26.

Baier, E. (1997). 'The impact of HIV and AIDS on rural households/communities and the need for multisectoral prevention and mitigation strategies to combat the epidemic in rural areas.' (FAO, Available online at http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/x0259e/x0259e00.htm. Accessed 11.02.2005)

Banda, K. (2007). 'Local food security monitoring systems: from historical context to present.' (Report prepared for the South African Food Security Directorate, PU Consulting Services, Pretoria).

Banda, K., and NoviAfrica (2007). 'Findings from focus group discussion and steps to set up a local food security monitoring system in Sekhukhune.' (Greater Sekhukhune FIVIMS Authority, HSRC, Pretoria).

Barany, M., Hammett A.L., Sene A., and Amichev B. (2001). Nontimber forest benefits and HIV and AIDS in sub-Saharan Africa. *Journal of Forestry* 99: 36–41.

Barany, M., Hammett, A. L., Stadler, K. M., and Kengni, E. (2004). Non-timber forest products in the food security and nutrition of smallholders afflicted by HIV and AIDS in sub-Saharan Africa. *Forests, Trees and Livelihoods* 14: 3–18.

Barany, M., Holding Anyonge, C., Kayambazinthu, D., and Sitoe, A. (2005). Firewood, food and medicine: interactions between forests, vulnerability and rural responses to HIV and AIDS. Ed. S Gillespie. [Proceedings from the IFPRI Conference: HIV and AIDS and Food and Nutrition Security]. Durban, South Africa, April 14 2005.

Barnett, T. (1994). 'The effects of HIV and AIDS on farming systems and rural livelihoods in Uganda, Tanzania and Zambia.' (FAO, Rome).

Barnett, T., and Blaikie, P. (1992). 'AIDS in Africa: its present and future impact.' (John Wiley: London).

Barnett, T., and Whiteside, A. (2002). Poverty and HIV and AIDS: Impact, coping and mitigation strategy. In 'Aids, public policy and child well-being'. (UNICEF: Florence).

Barnett, T., Tumushabe, J., Bantebya, G., Sebuliba, R. S., NgaSongwa, J., Kapinga, D., Ndelike, M., Drinkwater, M., Mitti, G., and Haslwimmer, M. (1995). The social and

economic impact of HIV and AIDS on farming systems and livelihoods in rural Africa: Some experience and lessons from Uganda, Tanzania and Zambia. *Journal of International Development* 7: 104–119.

Barnett, T., Blas, E., and Whiteside, A. (1996). 'Integrating HIV and AIDS into sectoral planning.' (WHO, Geneva).

Barnighausen, T., Hosegood, V., Timaeus, I. M., and Newell, M. (2007). The socioeconomic determinants of HIV incidence: evidence from a longitudinal, population-based study in rural South Africa. *AIDS* 21: S29–S38.

Barrére, B. (2005). 'Pre-test of new HIV indicators.' (Presentation from ORC Macro, UNICEF, DHS & USAID, Washington, DC).

Baylies, C. (2002). The impact of AIDS on rural households in Africa: A shock like any other? *Development and Change* 33: 611–32.

Bechu, N. (1998). The impact of AIDS on the economy of families in Cote d'Ivoire: Changes in consumption among AIDS-affected households. In 'Confronting AIDS: Evidence from the developing world: Selected background papers for the World Bank Policy Research Report.'. (Eds M. Ainsworth, L. Fransen, and M. Over) pp. 36–69. (European Commission United Kingdom and AIDS Analysis Africa: London).

Beegle, K. (2005). Labor effects of adult mortality in Tanzanian households. *Economic Development and Cultural Change* 53: 655–83.

Beegle, K., Dehejia, R. H., and Gatti, R. (2006). Child labor and agricultural shocks. *Journal of Development Economics* 81: 80–96.

Beisel, W. R. (2002). Nutritionally acquired immune deficiency syndromes. In 'Micronutrients and HIV infection'. (Ed H. Friss) pp. 24–42. (CRC Press: Boca Raton, Florida).

Bell, C., Devarajan, S., and Gersbach, H. (2006). The long-run economic costs of AIDS: Theory and an application to South Africa. *The World Bank Economic Review* 20: 55–89.

Bhat, R. B., and Rubuluza, T. (2000). The biodiversity of traditional vegetables in the Transkei region in the Eastern Cape of South Africa. *South African Journal of Botany* 68: 94–9.

Bickel, G., Nord, M., Price, C., Hamilton, W., and Cook, J. (2000). 'Guide to measuring household food security, revised.' (USDA, Food and Nutrition Service: Alexandria, VA).

Block, S., and Webb, P. (2001). The dynamics of livelihood diversification in post-famine Ethiopia. *Food Policy* 26: 333–50.

Bollinger, L., and Stover, J. (1999). 'The economic impact of AIDS in South Africa.' (The Futures Group International, London).

Booysen, F. R. (2002). HIV and AIDS and Poverty: Evidence from a Household Impact Study conducted in the Free State province, South Africa. [Proceedings of the DPRU Conference]. Johannesburg, South Africa, 22 October 2002.

Booysen, F. R. (2003). 'HIV and AIDS and poverty dynamics.' (University of the Free State, Bloemfontein, South Africa).

Booysen, F. R. (2004). Social grants as safety nets for HIV and AIDS-affected households in South Africa. *Journal of Social Aspects of HIV and AIDS Research Alliance* 1: 45–56.

Browne, M., Ortmann, G. F., and Hendriks, S. (2007). Expenditure elasticities for rural households in the Embo ward, Umbumbulu, KwaZulu-Natal. *Agrekon* 46: 566–83.

Bryceson, D. F. (1996). Deagrarianization and rural employment in sub-Saharan Africa: a sectoral perspective. World Development 24: 97–111.

Bryceson, D. F. (2003). 'Sustainable rural livelihoods in sub-Saharan Africa: A sectoral perspective.' (Afika-studiecentrum: Leiden).

Bundy, C. (1988). 'The rise and fall of the South African peasantry.' (David Philip: Cape Town).

Cairns, R., and Lea, J. D. (1990). An agricultural survey of subsistence farmers in the Nkandla district of KwaZulu. *Development Southern Africa* 7: 77–104.

Campbell, B. M., Jeffrey, S., Kozanayi, W., Luckert, M., Mutamba, M., and Zindi, C. (2002). 'Household livelihoods in semi-arid regions.' (SMK Grafika Desa Putera; Centre for International Forestry Research: Jakarta, Indonesia).

Carter, M., May.J., Aguero, J., and Ravindranath, S. (2007). The economic impacts of premature adult mortality: panel data evidence from KwaZulu-Natal, South Africa. *AIDS* 21: S67–S73.

Casale, D. (2004). 'What has the feminisation of the labour market bought women in South Africa: Trends in labour force participation, employment and earnings, 1995–2001.' (City of Cape Town Council, Cape Town).

Cavendish, W. (2000). Empirical regularities in the poverty-environment relationship of rural households: Evidence from Zimbabwe. *World Development* 28: 1979–2003.

Chung, K. L., Haddad, J., Ramakrishkns, J., and Reiley, F. (1997a). 'Identifying the food insecure: The application of mixed-method approaches in India.' (International Food Policy Research Institute, Washington DC).

Chung, K. L., Haddad, L., Ramakrishna, J., and Riely, F. (1997b). 'Alternative approaches to locating the food insecure: Qualitative and quantitative evidence from South India.' (International Food Policy and Research Institute, Food Consumption and Nutrition Division, Washington DC).

Coates, J. (2004). 'Experience and expression of food insecurity across cultures: Practical implications for valid measurement.' (Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington DC).

Coates, J., Frongillo, E. A., Lorge Rogers, B., Webb, P., Wilde, P. E., and Houser, R. (2006a). Commonalities in the experience of household food insecurity across cultures: what are measures missing? *Journal of Nutrition* 136: 1438S–48S.

Coates, J., Wilde, P. E., Webb, P., Lorge Rogers, B., and Houser, R. F. (2006b). Comparison of a qualitative and a quantitative approach to developing a household food insecurity scale for Bangladesh. *Journal of Nutrition* 136: 1420S–30S.

Cogill, B. (2003). 'Anthropometric indicators measurement guide.' (Food and Nutrition Technical Assistance Project, USAID: Washington DC).

Collins, D., and Leibbrandt, M. (2007). The financial impact of HIV and AIDS on poor households in South Africa. *AIDS* 21: S75–S81.

D'Haese, M., and Van Huylenbroeck, G. (2005). The rise of supermarkets and changing expenditure patterns of poor rural households case study in the Transkei area, South Africa. *Food Policy* 30: 97–113.

De Klerk, M., Drimie, S., Aliber, M., Mini, S., Makoena, R., Randela, R., Modiselle, S., Vogel, C., De Swardt, C., and Kirsten, J. (2004). 'Food security in South Africa: key policy issues for the medium term.' (Position paper for the National Treasury, HSRC, Pretoria).

De Swardt, C. (2004). 'Report of the socio-economic status of Mt Frere households in 2002.' (Program for Land and Agrarian Studies (PLAAS), University of the Western Cape, Cape Town).

De Waal, A. (1989). 'Famine that kills: Darfur, Sudan, 1984–85.' (Clarendon Press: Oxford).

De Waal, A., and Tumushabe, J. (2003). 'HIV and AIDS and food security in Africa.' (DFID, Available online at http://www.sarpn.org.za/documents/d0000235/P227_AIDS_Food_Security.pdf. Accessed 2008.11.21).

De Waal, A., and Whiteside, A. (2003). New variant famine: AIDS and food crisis in southern Africa. *The Lancet* 362: 1234–7.

Department of Agriculture (2002). The integrated food security strategy for South Africa. *Government Papers*, 45 pages.

Department of Agriculture (2006). Food insecurity in Sekhukhune. *Food Security Information Brief* 1: 1–3.

Department of Agriculture (2007). FIVIMS fighting hunger: Linking information to action: Local monitoring systems need strengthening to address food insecurity. *Food Security Information Brief* 16: 1–3.

Department of Agriculture and Environmental Affairs (2007). 'Press release: KZN Agriculture and Environmental affairs MEC visits drought-hit areas in the north region.' (KZN Agriculture and Environmental affairs, Media liaison officer, Durban).

Desmond, C., and Gow, J. (2001). 'Sickness, death and poverty: our bequest to orphans.' (University of KwaZulu-Natal, Durban).

Devereux, S., and Maxwell, S. (2001). Introduction. In 'Food security in sub-Saharan Africa'. (Eds S. Devereux and S. Maxwell) pp. 1–12. (University of Natal Press: Pietermaritzburg).

Devereux, S., Baulch, B., Hussein, K., Shoham, J., Sida, H., and Wilcock, D. (2004). 'Improving the analysis of food insecurity. Food insecurity measurement, livelihoods approaches and policy: Applications in FIVIMS.' (Food Insecurity and Vulnerability

Information and Mapping Systems (FIVIMS) Secretariat, Available online at http://www.ipcinfo.org/attachments/Devereux_FIVIMS_paper.pdf. Accessed 2008.11.22).

DFID (1997). 'The UK white paper on international development - and beyond.' (Department for International Development, London).

Donovan, C., Bailey, E., Mpyisi, E., and Weber, M. (2005). 'Prime-age adult morbidity and mortality in rural Rwanda: Effects on household income, agricultural production, and food security strategies.' (Department of Agriculture, Food and Resource Economics, Michigan State University, Available online at http://www.aec.msu.edu/agecon/fs2/rwanda/index.htm. Accessed 2008.09.08).

Dorrington, R., Johnson, L. F., Bradshaw, D., and Daniel, T. (2006). 'The demographic impact of HIV and AIDS in South Africa. National and provincial indicators for 2006.' (Centre for Actuarial Research, South African Medical Research Council and Actuarial Society of South Africa, Cape Town).

Dorrington, R., and Bourne, D. (2008). Has HIV prevalence peaked in South Africa? - Can the report on the latest antenatal survey be trusted to answer this question? *South African Medical Journal* 98: letter to the editor.

Dovie, D. B. K., Shackleton, C. M., and Witkowski, E. T. F. (2002). Direct use values of natural resources consumed and traded, South Africa. *International Journal of Sustainable Development and World Ecology* 9: 269–83.

Dovie, D. B. K., Witkowski, E. T. F., and Shackleton, C. M. (2004). Monetary valuation of livelihoods for understanding the composition and complexity of rural households. *Agriculture and Human Values* 22: 87–103.

Dovie, D. B. K., Shackleton, C. M., and Witkowski, E. T. F. (2007). Conceptualizing the human use of wild edible herbs for conservation in South African communal areas. *Journal of Environmental Mangement* 84: 146–56.

Drimie, S. (2002). 'The impact of HIV and AIDS on land: case studies from Kenya, Lesotho and South Africa.' (FAO, Rome. Available online at http://www.sarpn.org.za/documents/d0000147/P143_Impact_of_HIVAIDS.pdf. Accessed 2005.04.08).

Drimie, S. (2003). HIV/Aids and land: case studies from Kenya, Lesotho and South Africa. *Development Southern Africa* 20: 647–58.

Drimie, S., and Gandure, S. (2005). 'The impact of HIV and AIDS on rural livelihoods in southern Africa: an inventory and literature review.' (FAO Sub-regional Office for Southern and Eastern Africa, Harare, Zimbabwe).

Drinkwater, M. (1993). 'The effects of HIV and AIDS on agricultural production systems in Zambia; an analysis and field reports of case studies carried out in Mpongwe, Ndola Rural District, and Teta Seranje District.' (FAO, Rome).

Drinkwater, M. (2003). HIV and AIDS and agrarian change in southern Africa. [Presentation for the United Nations Regional Inter-Agency Coordination and Support Office Technical Consultation on Vulnerability in the light of an HIV and AIDS pandemic]. Johannesburg, South Africa, April 4 2003.

Du Guerny, J. (2002). 'Agriculture and Aids.' (UNDP South East Asia HIV and Development Project, Bangkok, Thailand).

du Toit, A., Skuse, A., and Cousins, T. (2007). The political economy of social capital: Chronic poverty, remoteness and gender in the rural Eastern Cape. *Social Identities* 13: 521–40.

du Toit, A. (2005). 'Chronic and structural poverty in South Africa: challenges for action and research.' (University of Western Cape, Cape Town).

Dwasi, J. (2002). 'HIV and AIDS and natural resource management in Africa: Findings from Kenya, Namibia, South Africa, and Uganda.' (Africa Biodiversity Collaborative Group (ABCG), Washington).

FANRPAN (2007). 'Silent hunger book: Policy options for effective responses to the impact of HIV and AIDS on Agriculture and Food Security in the SADC region. Compilation based on research conducted in Botswana, Lesotho, Namibia, Swaziland, South Africa, Zambia and Zimbabwe.' (FANRPAN: Available online at www.fanrpan.org/documents/d00351/1-FANRPAN_Silent_Hunger_2007.pdf. Accessed 2008.07.22).

FAO (1995). 'The effects of HIV and AIDS on farming systems in Eastern Africa.' (FAO, Rome).

FAO (2003a). 'HIV and AIDS and agriculture: Impacts and responses: case studies from Namibia, Uganda and Zambia.' (FAO, Rome).

FAO (2003b). 'The impacts of HIV and AIDS on the agricultural sector and rural livelihoods in northern Namibia.' (FAO, Rome).

FAO (2003c). 'The impacts of HIV and AIDS on the agricultural sector and rural livelihoods in Uganda.' (FAO, Rome).

FAO (2003d). 'The impacts of HIV and AIDS on the agricultural sector and rural livelihoods in Zambia.' (FAO, Rome).

FAO (2004). Forestry and agroforestry in multisectoral HIV and AIDS programming. FAO HIV and AIDS programme. (FAO, Rome).

FAO VAC (2004). 'Swazi VAC: a study to determine the links between HIV and AIDS, current demographic status and livelihoods in rural Swaziland.' (FAO Vulnerability Assessment Committee (VAC), Rome).

Ferguson, E., Gibson, R., Opare-Obisaw, C., Osei-Opare, C., Lamba, C., and Ounpuu, S. (1993). Seasonal food consumption patterns and dietary diversity of rural preschool Ghanain and Malawian children. *Ecology of Food and Nutrition* 29: 219–34.

Filmer, D., and Pritchett, D. H. (2001). Estimating wealth effects without expenditure data-or tears: An application to educational enrolments in states of India. *Demography* 38: 115–32.

Fleuret, A. (1979). The role of wild forage plants in the diet: a case study of Lushoto, Tanzania. *Ecology of Food and Nutrition* 8: 87–93.

Food and Nutrition Technical Assistance (FANTA) (2002). 'Dietary diversity as a household food security indicator.' (Academy for Educational Development, Washington DC).

Frankenberger, T. R., and McCaston, M. K. (1999). 'The household livelihood security concept.' (CARE USA, Washington DC).

Friss, H. (1998). The possible role of micronutrients in HIV infection. *SCN News* 17: 11–2.

Frongillo, E. (1999). Causes and aetiology of stunting. *Journal of Nutrition* 129: S295–S305.

Frongillo, E. A., and Nanama, S. (2006). Development and validation of an experience based measure of household food insecurity within and across seasons in Burkina Faso. *American Society for Nutrition* 136: 1409S–19S.

Frongillo, E., Chowdhury, N., Ekstrom, E., and Naved, R. T. (2003). Understanding the experience of household food insecurity in rural Bangladesh leads to a measure different from that used in other countries. *The Journal of Nutrition* 133: 4158–62.

Galea, S., Ahern, J., and Karpati, A. (2005). A model of underlying socioeconomic vulnerability in human populations: evidence from variability in population health and implications for public health. *Social Science and Medicine* 60: 2417–30.

Gari, J. A. (2004). 'Plant diversity, sustainable rural livelihoods and the HIV and AIDS crisis.' (UNDP and FAO, Bangkok, Thailand. Available online at http://www.hiv-development.org/text/publications/plant_diversity.pdf. Accessed 2005.02.13).

Gertler, P., Levine, D., and Moretti, E. (2006). Is social capital the capital of the poor? The role of family and community in helping insure living standards against health shocks. *CESifo Economic Studies* 52: 455–99.

Gillespie, S. (1989). Potential impacts of AIDS on farming systems: A case study from Rwanda. *Land Use Policy* 6: 301–12.

Gillespie, S., and Kadiyala, S. (2005). 'HIV and AIDS and food and nutrition security: from evidence to action.' (IFPRI, Washington DC).

Gillespie, S., Haddad, L., and Jackson, H. (2001). 'HIV and AIDS, food and nutrition security; Impacts and actions.' (WFP, Rome).

Guinand, Y., and Lemessa, D. (2001). Wild food plants in Ethiopia: reflections on the role of 'wild foods' and 'famine foods' in times of drought. [Conference on Nutrition and Food Security for Ethiopia] United Nations Development Program (UNDP), Emergencies unit for Ethiopia (UNDP-EUE Available online at http://pdf.dec.org/pdf_docs/Pnacl441.pdf#page=42. Accessed 2008.11.22). Italy, Rome, January 14, 2001.

Gwatkin, D. R., Rustein, S., and Johnston, K. (2000). 'Socio-economic differences in Brazil.' (HNP Poverty Thematic Group of the World Bank, Washington, DC).

Haddad, L., Sullivan, J., and Kennedy, E. (1992) 'Identification and evaluation of alternative indicators of food and nutrition security: Some conceptual issues and an analysis of extant data.' (International Food Policy Research Institute, Food and Nutrition Monitoring Project, Washington, DC).

Haddad, L., Kennedy, E., and Sullivan, J. (1994). Choice of indicators for food security and nutrition monitoring. *Food Policy* 19, 329-43.

Haddad, L., and Gillespie, S. (2001). Effective food and nutrition policy responses to HIV and AIDS: what we know and what we need to know. *Journal of International Development* 13: 487–511.

Hamilton, W. L., Cook, J., Thompson, W. W., Buron, L. F., Frongillo, E. A., Olson, C. M., and Wehler, C. A. (1997). 'Household food security in the United States in 1995. Technical report of the food security measurement project.' (United States Department of Agriculture, Washington, DC).

Hammarskjold, M. (2003). 'The environment, natural resources and HIV and AIDS.' (SIDA: Environment Policy Division, Geneva).

Haslwimmer, M. (1994). 'What has AIDS to do with agriculture?' (FAO, Rome).

Hatloy, A., Hallund, J., Diarra, M. M., and Oshaug, A. (2000). Food variety, socioeconomic status and nutritional status in urban and rural areas in Koutiala (Mali). *Public Health and Nutrition* 3: 57–65.

HBO documentary films (2006). 'Orphans of Nkandla: Synopsis.' (HBO Documentary Films, in association with BBC Four Documentaries., Available online at http://www.hbo.com/docs/programs/orphansofnkandla/index.html. Accessed 2008.12.01).

Helliwell, J. F., and Putnam, R. D. (2004). The social context of well-being. *Philosophical Transactions of the Royal Society of London* 15: 1435–46.

Hemrich, G., and Schneider, B. (1997). 'HIV and AIDS as a cross-sectoral issue for technical co-operation; focus on agriculture and rural development.' (GTZ HIV and AIDS Prevention and Control in Developing Countries, Available online at http://www.synergyaids.com/documents/GTZ_cross-sectorial_eng.pdf. Accessed 2008.11.21).

Hendriks, S. (2003). The potential for nutritional benefits from increased agricultural production in rural KwaZulu-Natal. *South African Journal of Agricultural Extension* 32: 28–44.

Hendriks, S. (2005). The challenges facing empirical estimation of household food (in)security in South Africa. *Development Southern Africa* 22: 108-23.

Hendriks, S., and Lyne, M. (2003a). Agricultural growth multipliers for two communal areas of KwaZulu-Natal. *Development Southern Africa* 20: 423–55.

Hendriks, S., and Lyne, M. (2003b). Expenditure patterns and elasticities of rural households sampled in two communal areas of KwaZulu-Natal. *Development Southern Africa* 20: 105–28.

High, C., and Shackleton, C. M. (2000). The comparative value of wild and domestic plants in home gardens of a South African rural village. *Agroforestry Systems* 48: 141–56.

Hlanze, Z. (2005). 'Impact of HIV and AIDS and drought on local knowledge systems for agrobiodiversity and food security.' (FAO-LinKS Swaziland, Durban, South Africa).

Hoddinott, J. (1999). 'Choosing outcomes indicators of household food security.' (International Food Policy Research Institute (IFPRI), Washington DC).

Hoddinott, J. (2002). 'Measuring dietary diversity: A guide.' (Food and Nutrition Technical Assistance, Academy for Education Development, Washington DC).

Hoddinott, J., and Yohannes, Y. (2002). 'Dietary diversity as a household food security indicator.' (Food Security and Technical Assistance Project (FANTA), Washington DC).

Houweling, T. A. J., Kunst, A. E., and Macenbach, J. P. (2003). Measuring health inequality among children in developing countries: does the choice of the indicator of economic status matter? *International Journal for Equity in Health* 2: 8.

Hunter, L., and Twine, W. (2005). Adult mortality, natural resources and food security: evidence from the Agincourt field site in rural South Africa. [Working Paper for the International Conference on HIV and AIDS and Food and Nutrition Security], International Food Policy Research Institute (IFPRI), Durban, South Africa, 14 April 2005.

Hunter, S., Buwlivwa, E., and Kisseka, E. (1993). Aids and agricultural production: report of a land utilization survey, Masaka and Rakai Districts of Uganda. *Land Use Policy* 10: 241–58.

Hunter, L. M., Twine, W., and Patterson, L. (2007). "Locusts are now our beef": Adult mortality and household dietary use of local environmental resources in rural South Africa. *Scandinavian Journal of Public Health* 35: 165–74.

Hunter, L., Twine, W., and Johnson, A. (2008). 'Adult mortality and natural resource use in rural South Africa: Evidence from the Agincourt Health and Demographic Surveillance Site.' (Institute of Behavioural Science, University of Colorado at Boulder, Boulder).

Hussein, K. (2002). 'The relevance of livelihoods approaches to food insecurity measurement.' (The Overseas Development Initiative (ODI), London).

International Fund for Agricultural Development (1997). 'Annual Report.' (Rome, IFAD).

Jansen van Rensburg, W. S., and Vorster, H. (2005). The utilisation of traditional leafy vegetables. [Sixth International Food Data Conference. Available from ARC-VOPI, Pretoria. South Africa], University of Pretoria, Pretoria, South Africa, 4 August 2005.

Jansen van Rensburg, W. S., van Averbeke, W., Slabbert, R., Faber, M., van Jaarsveld, P., Van Heerden, I., Wenhold, F. A. M., and Oelofse, A. (2007). African leafy vegetables in South Africa. *Water South Africa* 33: 317–26.

Jayne, T., Villarreal, P., Pingali, P., and Hemrich, G. (2005). 'HIV and AIDS and the agricultural sector in eastern and southern Africa: Anticipating the consequences.' (Agricultural and Development Economics Division, Food and Agriculture Organization (FAO)). ESA Working Paper No.04-06, Available online at www.fao.org/es/esa and http://www.aec.msu.edu/agecon/fs2/adult_death/idp25.pdf. Accessed 2008.05.22.

Jayne, T., Chapoto, A., Byron, E., Ndiyoi, M., Hamazakaza, P., Kadiyala, S., and Gillespie, S. (2006). Community-level impacts of AIDS-related mortality: Panel survey evidence from Zambia. *Review of Agricultural Economics* 28: 440–57.

Jooma, M. B. (2005). Southern Africa assessment: food security and HIV and AIDS. *African Security Review* 14: 59–66.

Kadiyala, S., and Gillespie, S. (2003). 'Rethinking food aid to fight AIDS.' (Food Consumption and Nutrition Division, IFPRI, Washington DC).

Kaschula, S. A. (2008). Wild food use in household food security responses to HIV and AIDS. *Population and Environment* 29: 162–85.

Kawachi, I., Kennedy, B. P., Lochner, K., and Prothrow-Stith, D. (1997). Social capital, income inequality, and mortality. *American Journal of Public Health* 84: 1492–8.

Kawachi, I., Kim, D., Coutts, A., and Subramanian, S. V. (2004). Commentary: Reconciling the three accounts of social capital. *International Journal of Epidemology* 33: 682–90.

Kayambazinthu, D., Sitoe, A., Barany, M., and Holding Anyonge, C. (2004). 'HIV and AIDS and the miombo woodlands of Mozambique and Malawi: an exploratory study.' (FAO, Rome).

Kennedy, E. (2005). 'Keynote paper: Qualitative measures of food insecurity and hunger.' (FAO, Rome).

Kinyuy, W. (2001). 'Cameroon: Traditional food preparations improve immune system of HIV and AIDS patients.' (World Bank, Washington DC).

Kirsten, J., Townsend, R., and Gibson, C. (1998). Determining the contribution of agricultural production to household nutritional status in KwaZulu-Natal, South Africa. *Development Southern Africa* 15: 573–87.

Kirsten, J., May, J., Hendriks, S., Lyne, M., Machethe, C., and Punt, C. (2003). Food security module: South Africa. [FAO. Roles of Agriculture Project International Conference], Italy, Rome, 3 February 2003. Available at ftp://ftp.fao.org/es/ESA/Roa/pdf/4_Food_Security/FoodSecurity_SouthAfrica.pdf. Accessed 2005.11.13.

Kruger, M., Sayed, N., Langenhoven, M., and Holing, F. (2005). 'Composition of South African foods: vegetables and fruit.' (HSRC, Pretoria).

Kwaramba, P. (1997). 'The socio-economic impact of HIV and AIDS on communal agricultural systems in Zimbabwe.' (Zimbabwe Farmers Union, Friedrich Ebert Stiftung Economic Advisory Project, Harare).

Lyne, M., and Ortmann, G. F. (1992). 'Evaluation of the KwaZulu farmer support program.' (Development Bank of Southern Africa, Pretoria).

Madlala, P., Marsland, N., Van Zyl, J., and Drimie, S. (2003). 'Towards identifying the vulnerability of AIDS afflicted households to food security.' (The RVAC-UNAIDS Experiences).

Mamo, G., Sjaastad, E., and Vedeld, P. (2007). Economic dependence on forest resources: A case from Dendi District, Ethiopia. *Forest Policy and Economics* 9: 916–27.

Martin, K., Rogers, B., Cook, J. T., and Joseph, H. M. (2004). Social capital is associated with decreased risk of hunger. *Social Science and Medicine* 58: 2645–54.

Masanjala, W. (2006). The poverty HIV and AIDS nexus in Africa: A livelihoods approach. *Social Science and Medicine* 64: 1041.

Mather, D., Donovan, C., Jayne, T., Weber, M., Mazhangara, E., Bailey, L., Yoo, K., Yamano, T., and Mghenyi, E. (2004). 'A cross-country analysis of household responses to adult mortality in rural sub-Saharan Africa: Implications for HIV and AIDS mitigation and rural development policies.' (Working Paper 82. Department of Agricultural Economics, Michigan State University, Available online at http://ideas.repec.org/p/msu/idpwrk/082.html. Accessed 2008.09.23).

Mather, D., Donovan, C., Jayne, T., and Weber, M. (2005). 'Using empirical information in the era of HIV and AIDS to inform mitigation and rural development strategies: Selected results from African country studies.' (Department of Agricultural Economics Department of Economics, Michigan State University).

Mauambeta, D. C., Miphaka, P., Kapindu, S., Lweysa, H., and Papila, M. (2002). 'Baseline survey of the community vitalization and afforestation in the middle Shire: results and analysis of Rapid Rural Appraisal conducted in 24 villages.' (Wildlife and Environmental Society of Malawi, Umbe, Malawi).

Mauambeta, D. C. (2003). 'HIV /AIDS mainstreaming in conservation, the case of WESM (Wildlife and Environmental Society of Malawi).' (WESM, Available online at http://www.generoyambiente.org/ES/articulos_estudios/docs/hivandconservation.pdf. Accessed 2005.03.12).

Maxwell, D. C. (1996). Measuring food insecurity: the frequency and severity of 'coping strategies'. *Food Policy* 21: 291–303.

Maxwell, S., and Slater, R. (2003). Food policy old and new. *Development Policy Review* 21: 531–53.

Maxwell, D. C., Ahiadeke, C., Levin, C., Armar-Klemesu, M., Zakariah, S., and Lamptey, G. (1999). Alternative food security indicators; revisiting the frequency and severity of coping strategies. *Food Policy* 24: 411–29.

Maxwell, D., Watkins, B., Wheeler, R., and Collins, G. (2003). 'The coping strategies index: A tool for rapidly measuring food security and the impact of food aid programs in emergencies.' (CARE Eastern and Central Africa Regional Management Unit and the World Food Programme Vulnerability Assessment and Mapping Unit, Nairobi).

McCann, M. (2005). 'Annexure 6: District profile Alfred Nzo district Municipality (DC 44). ' (European Consultants Organisation (ECO): Eastern Cape competitive advantage assessment and training support project., OXFAM, London, England).

McGarry, D. (2007). 'The impact of HIV and AIDS on rural children's reliance on biodiversity within the Eastern Cape, South Africa.' (Unpublished Masters Thesis, Rhodes University , Grahamstown, South Africa).

McKenzie, D. J. (2003). 'Measure inequality with asset indicators.' (Cambridge, MA, Bureau for Research and Economic Analysis of Development, Centre for International Development, Harvard University).

Menon, R., Wawer, M. J., Konde-Lule, J. K., Sewanlambo, N. K., and Li, C. (1998). The economic impact of adult mortality on households in Rakai district, Uganda. In 'Confronting AIDS: evidence from the developing world'. (Eds M. Ainsworth, L. Fransen, and M. Over) (European Commission: Brussels).

Mertz, O., Lykke, A. M., and Reenberg, A. (2001). Importance and seasonality of vegetable consumption and marketing in Burkina Faso. *Economic Botany* 55: 276–89.

Migotto, M., Davis, B., Carletto, G., and Beegle, K. (2005). 'Measuring food security using respondents' perception of food consumption adequacy.' (Agricultural and Development Economics Division, The Food and Agricultural Organisation of the United Nations, Washington, DC).

Milton, S. J. (1992). 'Statistical methods in the biological and health sciences.' **(**Mcgraw Hill Series in Probability and Statistics, Harvard University Press, Boston).

Mishra, V., Bignami, S., Greener, R., Veassen, M., and Hong, R. (2007a) 'A study of the association of HIV infection with wealth in sub-Saharan Africa.' (USAID, Available online at http://www.measuredhs.com/pubs/pdf/WP31/WP31.pdf. Accessed 09.12.2008).

Mishra, V., Bignami-Van, S., Greener, R., Vaessen, M., Rathavuth, H., Ghys, P. D., Bierma, J. T., Van Assche, A., Khan, S., and Rutstein, S. (2007b). HIV infection does not disproportionately affect the poorer in sub-Saharan Africa. *AIDS* 21, S17-S28.

Modi, A. T., Modi, M., and Hendriks, S. (2006). Potential role for wild vegetables in household food security: a preliminary case study in KwaZulu-Natal, South Africa. *African Journal of Food, Agriculture, Nutrition and Development* 6: 1–8.

Montgomery, M. R., Gragnolati, K., Burke, A., and Paredes, E. (2000). Measuring living standards with proxy variables. *Demography* 37: 155–74.

Mphale, M. M., Rwambali, E. G., and Makoae M.G. (2002). HIV and AIDS and its impacts on land tenure and livelihoods in Lesotho. [FAO/SARPN workshop on HIV and AIDS and Land Tenure]. Pretoria, South Africa, 9 May 2002. Available at http://www.sarpn.org.za/EventPapers/june2002/hiv/papers/lesotho/lesotho.pdf. Accessed 2005.05.04.

Mucina, L., and Rutherford, C. (2006). 'Vegetation Atlas of South Africa, Lesotho and Swaziland.' (South African National Biodiversity Institute: Pretoria).

Murray, C. (1981). 'Families divided: the impact of migrant labour in Lesotho'. (Cambridge University Press: Cambridge).

Mutangadura, G., Mukurazita, D., and Jackson, H. (1999). 'A review of household and community responses to the HIV and AIDS epidemic in the rural Sub-Saharan Africa.' (Joint United Nations Program on HIV and AIDS (UNAIDS, Geneva).

Muwanga, F. T. (2002). 'Impact of HIV and AIDS on agriculture and the private sector in Swaziland: The demographic, social and economic impact on subsistence agriculture, commercial agriculture.' (Ministry of Agriculture and Co-operatives and Business, Swaziland).

Narayan, D., and Cassidy, M. (1999). 'A dimensional approach: Social capital survey in Ghana.' (World Bank, London).

National Department of Health (2008). 'The national HIV and syphilis prevalence survey South Africa.' (South African Department of Health, Available online at http://www.doh.gov.za/docs/antenatal-f.html. Accessed 2008.10.29).

Ncube, G. (1998). The Impact of HIV and AIDS on smallholder agriculture production in the districts of Gweru/ Shurugwi in Zimbabwe and the current recommended sustainable coping strategies and areas of research. [East and Southern Africa Regional Conference on Responding to HIV and AIDS: Development Needs of African Smallholder Agriculture]. SADC, Harare, Zimbabwe, 14 July 1998.

Ngwenya, B. N., and Mosepele, K. (2007). HIV and AIDS, artisanal fishing and food security in the Okavango Delta, Botswana. *Physics and Chemistry of the Earth* 32: 1339–49.

Nord, M., Satpathy, A. K., Raj, N., Webb, P., and Houser, R. (2002). 'Comparing household survey-based measures of food insecurity across countries: Case studies in India, Uganda and Bangladesh.' (Friedman School of Nutrition Science and Policy. Discussion Paper No 7, Tufts University).

O'Donnell, M. (2004). 'Food security, livelihoods & HIV and AIDS: A guide to the linkages, measurement & programming implications.' (Save the Children UK, London).

Odhav, B., Beekrum, S., Akula, U. S., and Baijnath, H. (2007). Preliminary assessment of nutritional value of traditional leafy vegetables in KwaZulu-Natal, South Africa. *Journal of Food Composition and Analysis* 20: 430–5.

Ogle, B. M., and Grivetti, L. (1985). Legacy of the chameleon: Edible wild plants in the Kingdom of Swaziland, southern Africa. A cultural, ecological, nutritional study. Part I - Introduction, objectives, methods, Swazi culture, landscape and diet. *Ecology of food and nutrition* 16: 193–208.

Ogle, B. M., Hung, P. H., and Tuyet, H. T. (2001). Significance of wild vegetables in micronutrient intakes of women in Vietnam: an analysis of food variety. *Asia Pacific Journal of Clinical Nutrition* 10: 21–30.

Paumgarten, F. (2007). 'The significance of the safety-net role of NTFPs in rural livelihoods, South Africa.' (Unpublished Masters Thesis, Rhodes University, Grahamstown, South Africa).

Pauw, K. W. (2007). Agriculture and poverty : farming for food or farming for money? *Agrekon* 46: 195–218.

Philips-Howard, K. D. (1999). The indigenization of exotic inputs by small-scale farmers on the Jos Plateau, Nigeria. In 'Biological and cultural diversity: The role of indigenous agricultural experimentation in development.'. (Eds G. Prain, S. Fujisaka, and M. Warren) pp. 80–91. (Intermediate Technology Publications: London).

Pieres, J. B. (1981). 'The house of Phalo: A history of the Xhosa people in their days of independence.' (Ravan Press: Johannesburg).

Pilkington, P. (2002). Social capital and health: measuring and understanding social capital at a local level could help to tackle health inequalities more effectively. *Journal of Public Health Medicine* 24: 156–9.

Piwoz, E., and Preble, E. (2002). 'HIV and AIDS and nutrition: a review of the literature and recommendations for nutritional care and support in sub-Saharan Africa.' (U.S. Agency for International Development, Washington DC).

PlusNews . (2007). Press release - Silent hunger: Policy options for effective responses to the impact of HIV and AIDS on agriculture and food security in the SADC Region PlusNews Services, 31 October 2007.

Posel, D., and Casale, D. (2003). What has been happening to internal labour migration in South Africa, 1993–1999. *South African Journal of Economics* 71: 455–79.

Pottier, J. (1999). 'Anthropology of food: the social dynamics of food security.' (Polity Press: Cambridge).

Poundstone, K. E., Strathdee, S. A., and Celentano, D. D. (2004). The social epidemiology of Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome. *Epidemiol Rev* 26: 22–35.

Pronyk, P. M., Harpham, T., Morison, L. A., Hargreaves, J. R., Kim, J. C., Phetla, G., Watts, C. H., and Porter, J. D. (2008). Is social capital associated with HIV risk in rural South Africa? *Social Science and Medicine* 66: 1999–2010.

Quinlan, T. (2004). The link between conservation and HIV and AIDS - what can be done? [Report of a special side event, World Parks Congress.]. HEARD (Heath Economics and HIV and AIDS Division), University of Natal. Durban, KwaZulu Natal, South Africa. 18 September 2004.

Radimer, K. L., Olson, C. M., and Capmbell, C. C. (1990). Development of food security indicators to assess hunger. *Journal of Nutrition* 120: 1544–8.

Rangasami, A. (1985). Failure of exchange entitlements theory of famine: a response. *Economic and Political Weekly* 20: 1747–53.

Reardon, T., Crawford, E., and Kelly, V. (1995). 'Promoting farm investment for sustainable intensification of agriculture.' (Department of Africultural Economics, Michigan State University, East Lansing).

Ruel, M. T. (2003). Operationalizing dietary diversity: A review of measurement issues and research priorities. *Journal of Nutrition* 3911S–26S.

Rugalema, G. (1999). It is not only the loss of labor: HIV and AIDS, loss of household assets and household livelihood in Bukoba District, Tanzania. In 'AIDS and African smallholder agriculture'. (Eds G. Mutangadura, H. Jackson, and D. Mukurazita) pp. 41–52. (SAFAIDS, MG Printers: Harare).

Rugalema, G. (2000). Coping or struggling? A journey into the impact of HIV and AIDS in southern Africa. *Review of African political economy* 27: 537–46.

SADC FANR Vulnerability Assessment Committee (2003). 'Towards identifying impacts of HIV and AIDS on food insecurity in southern Africa and implications for response: Findings from Malawi, Zambia and Zimbabwe.' (Southern African Development Community, Food, Agriculture and Natural Resource Vulnerability Assessment Committee (FANR), Harare, Zimbabwe).

SADC FANR Vulnerability Assessment Committee (2004). 'Regional emergency food security assessment report.' (Southern Africa Development Community, Harare, Zimbabwe).

Saihpush, M., Borland, R., Taylor, J., Singh, G. K., Ansari, Z., and Serraglio, A. (2006). The association of smoking with perception of income inequality, relative material well-being and social capital. *Social Science and Medicine* 63: 2901–812.

Sampson, R., Raudenbush, S., Earls, F. (1997). Neighbourhoods and violent crime: a multilevel study of collective efficacy. *Science* 277: 918-924.

SARPN (2004). 'Scoping study: DFID regional hunger and vulnerability programme .' (Southern African Regional Poverty Network (SARPN), Pretoria).

Sauerbarn, R., Adams, A., and Hein, M. (1996). Household strategies to cope with the economic costs of illness. *Social Science and Medicine* 43: 291–301.

Savy, M., Martin-prevel, Y., Sawadogo, P., Kameli, Y., and Delepeuch, F. (2005). Use of variety/diversity scores for diet quality measurement: relation with nutritional status of women in a rural area of Burkina Faso. *European Journal of Clinical Nutrition* 59: 716.

Schippers, R. R. (2000). 'African indigenous vegetables. An overview of the cultivated species.' (Natural Resources Institute/ACP-EU Technical Centre for Agricultural and Rural Cooperation, Chatham, UK).

Schmidt, M. I., and Vorster, H. H. (1995). The effects of communal gardens on nutritional status. *Development Southern Africa* 12: 713–25.

Schroeder, E., and Nichola, T. (2006). The adoption of HIV and AIDS orphans and food security in rural Ingwavuma, South Africa. *International Journal of Technology Management and Sustainable Development* 5: 173–87.

Seaman, J. (2001). Household economy approaches in sub-national and national decision making. Ed. H Sida. [Proceedings of the FAO FIVIMS International Scientific Symposium on Measurement and Assessment of Food Deprivation and Under-Nutrition]. ODI Food Security Technical Support Facility, Italy, Rome, 12 October 2001.

Semba, R. D., and Tang, A. M. (1999). Micronutrients and the pathogenesis of human immunodeficiency virus infection. *British Journal of Nutrition* 81: 181–9.

Senefeld, S., and Polsky, K. (2005). 'Chronically ill households, food security and coping strategies in rural Zimbabwe.' (Consortium for Southern Africa's Food Emergency (C-SAFE) and Catholic Relief Services (CRS)).

Shackleton, C. M. (1993). Are the communal grazing lands in need of saving? *Development Southern Africa* 10: 54–69.

Shackleton, C. M., and Shackleton, S. E. (2003). Value of non-timber forest products and rural safety nets in South Africa. [CIFOR international conference: rural livelihoods, forests and biodiversity]. CIFOR, Bonn, Germany, 19 May 2003.

Shackleton, C. M., and Shackleton, S. E. (2004). The importance of non-timber forest products in rural livelihood security and as safety-nets: evidence from South Africa. *South African Journal of Science* 100: 658–64.

Shackleton, C. M., and Shackleton, S. E. (2006). Household wealth status and natural resource use in the Kat River valley, South Africa. *Ecological Economics* 57: 306–17.

Shackleton, S. E., Dzerefos, C. M., Shackleton, C. M., and Mathabela, F. R. (1998). Use and trading of wild edible herbs in the central lowveld savanna region, South Africa. *Economic Botany* 52: 251–9.

Shackleton, S. E., Cocks, M. L., Dold, T., Kaschula, S. A., Kokwe, G., Mbata, K., and von Maltitz, G. (2008). Non-timber forest products and livelihoods. In 'African dry forests'. (Ed E. Chidumayo) (CIFOR: Bogor, Indonesia).

Shah, M. K., Osborne, N., Mbilizi, T., and Vilili, G. (2002). 'The impact of HIV and AIDS on agricultural productivity and rural livelihoods in the central region of Malawi.' (CARE International, Lilongwe, Malawi).

Shelton, J. D., Cassell, M., and Adetunji, J. (2005). Is poverty or wealth the root of HIV? *The Lancet*, 366: 1057–1058.

Smith, G. C., Clegg, M. S., Keen, C. L., and Grivetti, L. E. (1996). Mineral values of selected plant foods common to southern Burkina Faso and to Niamey, Niger, West Africa. *International Journal of Food Sciences and Nutrition* 47: 41–53.

Swindale, A., and Blinisky, P. (2005). 'Household dietary diversity score for measurement of household food access: indicator guide.' (FANTA technical report, Washington DC).

Taylor, N., and Cairns, R. (2001). May farming make a contribution to poverty alleviation in a 'deep rural' area in South Africa? - Lessons from Oxfam GB's Sustainable Livelihood Programme at Nkandla, KwaZulu-Natal. [SARPN conference on Land Reform and Poverty Alleviation in Southern Africa]. SARPN, Pretoria, South Africa, 15 June 2001.

Thamaga-Chitja, J., Hendriks, S., Ortmann, G. F., and Green, M. (2004). Impact of maize storage on rural household food security in Northern Kwazulu-Natal. *Journal of Family Ecology and Consumer Services* 32: 8–15.

Thomas, F. (2006). Stigma, fatigue and social breakdown: Exploring the impacts of HIV and AIDS on patient and carer well-being in the Caprivi Region, Namibia. *Social Science and Medicine* 63: 3174–87.

Tibaijuka, K. (1997). AIDS and economic welfare in peasant agriculture: case studies from Kagabiro village, Kagera region, Tanzania. *World Development* 25: 963–75.

Timmermans, H. G. (2004). 'Rural livelihoods at Dwesa/Cwebe : poverty, development and natural resource use on the Wild Coast, South Africa.' (Masters Thesis, Rhodes University, Grahamstown, South Africa).

Topouzis, D., and Hemrich, G. (1998). 'The socioeconomic impact of HIV and AIDS on rural families in Uganda.' (UNDP, New York).

Torell, E., Kalangahe, B., Thaxton, M., Issa, A., Pieroth, V., and Tobey, J. (2007a). 'Guidelines for mitigating the impacts of HIV and AIDS on coastal biodiversity and natural resource management.' (Population Reference Bureau, Washington DC).

Torell, E., Tobey, J., Thaxton, M., Crawford, B., Kalangahe, B., Madulu, N., Issa, A., Makota, V., and Sellema, R. (2007b). Examining the linkages between AIDS and biodiversity conservation in coastal Tanzania. *Ocean and Coastal Management* 49: 792–811.

Torheim, L. E., Barikmo, I., Parr, C. L., Hatloy, A., Ouattara, F., and Oshaug, A. (2003). Validation of food variety as an indicator of diet quality assessed with a food frequency questionaire for Western Mali. *European Journal of Clinical Nutrition* 57: 1283–91.

Torheim, L. E., Ouattara, F., Diarra, M., Thiam, F. D., Barikmo, I., Hatloy, A., and Oshaug, A. (2004). Nutrient adequacy and dietary diversity in rural Mali: association and determinants. *European Journal of Clinical Nutrition* 57: 1283–91.

Twine, W., and Hunter, L. (2008). 'HIV and AIDS mortality and the role of woodland resources in the maintenance of household food security in a rural district of South Africa.' (International Food Policy Research Institute (IFPRI) and Regional Network on HIV and AIDS, Rural Livelihoods, and Food Security (RENEWAL), Available online at http://www.ifpri.org/renewal/pdf/SAWoodland.pdf. Accessed 2008.12.03).

Twine, W., Moshe, D., Netshiluvhi, T. R., and Siphugu, T. (2003). Consumption and direct-use values of savanna bio-resources used by rural households in Mametja, a semi-arid area of Limpopo province, South Africa. *South African Journal of Science* 99: 467–73.

UNAIDS (2008). 'Adult (15–49) HIV prevalence percent by country, 1990–2007.' (UNAIDS, Available online at http://www.unaids.org/en/KnowledgeCentre/HIVData/Epidemiology/latestEpiData.asp. Accessed 2008.11.01).

United Nations (1975). 'Report of the World Food Conference, 5–16 November 1974. ' (United Nations, New York and Rome).

uThungulu District Municipality (2007a). 'Regional development plan for the Nkandla district.' (Uthungulu Municipality, Available online at http://www.uthungulu.org.za/Planning/Regional/FinalRegional/Nkandla/Part1/A%20SUBREGIONAL%20DEVELOPMENT%20PLAN.html. Accessed 2007.05.09).

uThungulu District Municipality (2007b). 'uThungulu Quality of Life Survey 2006/2007.' (uThungulu District Municipality, Available online at http://www.uthungulu.org.za/Website/Settings/PageTemplates/index.aspx. Accessed 2008.11.23).

uThungulu District Municipality (2008). 'uThungulu IDP 2007/2008.' (uThungulu District Municipality, http://www.uthungulu.org.za/Website/Settings/PageTemplates/index.aspx, accessed 2008.11.23).

Van Averbeke, and Khosa, T. B. (2007). The contribution of smallholder agriculture to the nutrition of rural households in a semi-arid environment in South Africa. *Water South Africa* 33: 410–418.

Van Rooyen, C. J., and Nene, S. (1996). What can we learn from previous farmer development strategies in South Africa? *Agrekon* 35: 325–31.

Van Wyk, B., and Gericke, N. (2000). 'People's plants. A guide to useful plants of southern Africa.' (Briza Publications: Pretoria).

Verduijn, R. (2004). 'Development of a comprehensive national FIVIMS in SA: International best practices.' (Department of Agriculture, Pretoria).

Vyas, S., and Kumaranayake, L. (2006). Constructing socio-economic status indices: how to use principle components analysis. *Health Policy and Planning* 21: 459–68.

Webb, P., Coates, J., Frongillo, E., Rogers, B., Swindale, A., and Blinsky, P. (2006). Measuring household food insecurity: why it's so important yet so difficult to do. *American Society for Nutrition* 136: S1404–S1408.

Webley, P., and Lea, S. E. G. (1993). The partial unacceptability of money in repayment for neighborly help. *Human Relations* 46: 65–76.

Wehmeyer, A. S., and Rose, E. F. (1983). Important indigenous plants used in the Transkei as food supplements. *Bothalia* 14: 613–5.

White, J., and Robinson, E. (2000). 'HIV and AIDS and rural livelihoods in sub-Saharan Africa.' (University of Greenwich, UK).

World Bank (1985). 'Poverty and hunger: Issues and options for food security in developing countries.' (World Bank, Washington DC).

World Bank (2007). 'The World Bank Group World Development Indicators.' (The World Bank Group, Available online at http://devdata.worldbank.org/data-query/. Accessed 2008.05.05).

Yamano, T., and Jayne, T. S. (2004). Measuring the impacts of working-age adult mortality on small-scale farm households in Kenya. *World Development* 32: 91–101

Addendum a: Addendum to Chapter 4

Table a1. P-values for key socio-economic and demographic variables in main-effects models for four possible outcomes, controlling for site alone. Significant effects are marked with a subscript letter. Odds Ratios and Confidence Intervals are annotated below.

Independent variable	Categorical Outcome (p-values)			
Socio-economic and demographic Variables				
	Child-labour	Plot-size	Crop-diversity	Cult. Fd in diet
Number of cattle	0.052	0.281	0.442	0.869
Weighted sum of livestock	0.448	0.361	0.632	0.648
PCA weighted wealth score	0.539	0.053	0.815	0.346
Social Capital score	0.095	0.3	0.446	0.783
Length of residence in house	0.897	0.127	0.812	0.12
Length of residence in village	0.564	0.411	0.74	0.195
No of workers	0.296	0.754	0.627	0.772
No of non-workers	0.017 a	0.921	0.227	0.107
No. of social grant recipients	0.091	0.008 f	0.026 h	0.023 j
Combined earned household income	0.118	0.756	0.824	0.397
Combined social grant income	0.472	0.085	0.138	0.001 k
Total income	0.18	0.43	0.802	0.793
Income: person ratio	0.04 b	0.734	0.105	0.431
Average adult education	0.405	0.376	0.877	0.156
Size of HH	0.081	0.627	0.102	0.192

Number of adult (18+) males	0.137	0.105	0.872	0.295
Number of adult (18+) females	0.275	0.071	0.765	0.789
Number of total adults	0.081	0.023 g	0.93	0.348
Number of under 18s	0.002 c	0.12	0.041 i	0.313
Ratio of children:adults	<0.001 d	0.276	0.188	0.567
Number aged 18-64	0.402	0.293	0.521	0.445
Female-headedness	0.04 e	0.477	0.918	0.956

a. OR 1.18 (1.03-1.34), b. OR 0.99 (0-98-0.99), c. OR 1.25 (1.09-1.43), d. OR 2.24 (1.55-3.25),

e. OR 1.81 (1.03-3.19); f. OR 0.84 (0.74-0.96), g. OR 1.16 (1.02-1.32); h. OR 0.84 (0.73-0.98), i. OR 0.88 (0.79-0.99);

j. OR 1.19 (1.02-1.39), k. OR 1.07 (1.03-1.11).

Table a2. P-values for key HIV and AIDS proxy variables in main-effects models for four possible outcomes, controlling for site alone. Significant effects are marked with a subscript letter. Odds Ratios and Confidence Intervals are annotated below.

	Categorical Outcomes (p-values)			
	Child-labour	Plot-size	Crop-diversity	Cultivated fd in diet
Independent Variables				
HIV and AIDS proxies				
Total deaths (18–64 yrs)	0.482	0.055	0.561	0.371

Total deaths (0–59 yrs)	0.495		0.021	d	0.561	0.144	
Total deaths with CI (18–64 yrs)	0.515		0.067		0.370	0.620	
Total deaths with CI (0–59 yrs)	0.585		0.037	e	0.304	0.377	
Total deceased females (18–59 yrs)	0.193		0.003	f	0.979	0.440	
Total deceased males (18–59 yrs)	0.811		0.968		0.311	0.231	
Total people with CI (all ages)	0.617		0.968		0.027	j	0.271	
Total people with CI (0–59 yrs)	0.161		0.734		0.015	k	0.259	
Total people with CI (18–64 yrs)	0.381		0.960		0.025	l	0.142	
Total people with CI and FT (0–59 yrs)	0.494		0.810		0.078	0.019	n
Total people with CI and FT (18–64 yrs)	0.551		0.913		0.079	0.031	o
Total maternal orphans	0.095		0.265		0.089	0.608	
Total maternal orphans (with grants)	0.025	a	0.317		0.019	m	0.790	
Total maternal orphans (no grants)	0.356		0.056		0.564	0.632	
Total paternal orphans	0.009	b	0.036	g	0.574	0.498	
Total paternal orphans (with grants)	0.029	c	0.706		0.233	0.765	
Total paternal orphans (no grants)	0.054		0.013	h	0.861	0.903	
Total double orphans	0.597		0.851		0.607	0.760	
Total double orphans (with grants)	0.051		0.444		0.083	0.828	
Total double orphans (no grants)	0.226		0.036	i	0.683	0.727	

a. OR 1.87 (1.08-3.24), b. OR 1.32 (1.07-1.63), c. OR 1.50 (1.04-2.17); d. OR 1.53 (1.07-2.20), e. OR 1.52 (1.03-2.25), f. OR 2.05 (1.27-3.33),

g. OR 1.16 (1.01-1.33), h. OR 1.28 (1.05-1.55), i. OR 1.37 (1.02-1.83); j. OR 0.74 (0.56-0.97), k. OR 0.68 (0.49-0.93), l. OR 0.65 (0.45-0.95),

m. OR 0.54 (0.32-0.90); n. 1.63 (1.08-2.47), o. OR 1.65 (1.05-2.60).

Addendum b: Household surveys

MODULE 1: INITIAL ASSESSMENT FORMS (TO BE TAKEN AT FIRST ASSESSMENT ONLY, MONTH 1) HHS#:_____ Site: _____
Interviewer: _____ Village: _____ Date: ___/___/_____

1 Name of household members		2 Relationship to Head of household	3 Sex	4 Age	*For under 19 only* 5 & 6 Where are your parents?	7 Physical Status	*Under 19 only* 8 Level of Education	*If older than 6 years* 9 What do or did they do to earn money?	10 What grants do they or did they receive?	11 Questions for long term illness or deceased
List all the people who belong to this house. *ALSO list any people who DIED in the last 2 years.*	Are they living in this house now or are they	1) Head of household 2) Wife or husband of Head of household 3) Son/daughter of Head of household 4) Father/mother of head of household 5) Brother/sister of head of household 6) Niece/Nephew of head of the household	1 M 2 F		1) Alive, living in this house 2) Alive, BUT not here 3) Deceased	1) No Sickness 2) Disabled 3) Long term illness *(Answer 11*)* 4) Both sick and disabled *(Answer*	1) Never been to school 2) Primary uncompleted 3)Primary completed 4)Secondary	1)YES- Earned income that was not a grant in the last 6 months IF Yes - continue below 1) NO - Has not worked or provided any income in the last	1) Pension 2) Foster grant 3) Child grant	* Long Term Illness A. Do they receive free care or treatment from a group or clinic? (Y/N) B. If long term illness, what is it they are suffering from? ** Deceased A. Did they receive any free treatment? (Y/N)B. If they were continuously sick, what were they suffering from? C. Were

	away? 1=present now 2=absent	7) Grandchild of Head of household 8) Other relative 9) Unrelated foster child 10) No relationship			5 Where is your Mother?	6 Where is your Father?	11*) 5) Deceased (Answer 11**)	Incomplete 5) Matric 6) Above Secondary	6 months		4) Disabled grant 5) Sickness grant (specify amount per month)	they continuously sick for many (at least 3) months before they died (Y/N) D. What was their age at death?			
									What work do they do?	Estimated Amount		A	B		D
1.															
2.															
3.															
4.															
5.															
6. etc...															

How many of the following livestock does your household own?

	Livestock type	Number of animals		Livestock type	Number of animals
	Chickens			Pigs	
	Cattle			Sheep	
	Goats			Other	

What do you cook with? (multiple responses possible)

		Yes	No			Yes	No
	Firewood	1	0		Paraffin	1	0
	Charcoal	1	0		Gas	1	0
	Dung	1	0		Electricity	1	0

Wealth Proxies: Does the house have any of the following

Domestic amenities in working order			
		Yes	No
	Hot running water	1	0
	Built in kitchen sink	1	0
	Flush toilet in/outside house	1	0
	Tap water in house/on plot	1	0
	Fridge/freezer combination	1	0
	A stove	1	0

	Microwave oven	1	0
	A hob	1	0
	TV set(s)	1	0
	Hi-fi or music centre	1	0
	Radio	1	0
	One or more cell phone(s)	1	0
	Bicycle	1	0

	Car	1	0
	Sofa	1	0
	Table	1	0

Dwelling place characteristics			
	Main house has plastered walls	1	0
	Ceilings on the roof	1	0
	Cement floors	1	0
Agricultural equipment			
	Plough	1	0
	Fork	1	0
	Hoe	1	0
	Spade	1	0

MODULE 2, SECTION A: REPEAT ASSESSMENT FORMS FOR ASSESSMENT 2, 3 AND 4 (MONTH 4, MONTH 7, MONTH 10)

Since our last visit 3 months ago, did you or anyone in your household experience any of the following?

	Yes	No		Yes	No
Move out of your house?			Did you experience any theft?		
Move into your house?			Failure of crops?		
Die?			Animals destroy or eat crops?		
Get sick?			Floods?		
Get better?			Drought?		
Begin treatment at a hospital or clinic?			Witchcraft?		
End their treatment at a hospital or clinic?			Anything else, any other misfortunes or shocks?		
Lose their job?					
Get a job, or secure temporary employment?					
Lose a social welfare or government grant?					
Gain a social welfare or government grant?					

If there were any "yes" answers above, probe for detail on what happened:	**For those members of the household who were sick or ill at the last**

			assessement (physical status code "3"), ask the following questions	
Name of person involved	What happened?	Money gained or lost (in RANDS p/month)	Name of sick person	How is their health status now? (0=worse than last visit, 1=the same, 2=better than last visit)

Large household expenses.

In the last 3 months (i.e. since our last visit), did your household have any expenses **out of the ordinary**. Eg; furniture, building, fencing, funerals, school fees, traditional ceremonies, lobola…

Description of expense	How much was the expense	Where did you get the money? (savings, pension, from a relative, loan, etc…)

MODULE 2, SECTION B: FOOD CONSUMPTION AND FOOD SECURITY RE-ASSESSMENTS - COMPLETED AT ASSESSMENT 1, 2, 3, 4 (MONTH 1, MONTH 4, MONTH 7, MONTH 10)

COPING STRATEGY INDEX

In the PAST 3 MONTHS, did you or any household member do or experience any of the following:	0= Not in last 3 months; 1 = once a week; 2 = 2-3 times a week; 3 = 4 times a week or more.			
1. Did you or any member of your household worry that your household would not have enough food?	0	1	2	3
2. Were you, or any member of your household not able to eat the kinds of foods you preferred?	0	1	2	3
3. Were you or any household member forced to eat a limited variety of foods because there were not the resources to get more?	0	1	2	3
4. Were you or any household member forced to eat food that you preferred not to eat, or were embarrassing to eat?	0	1	2	3
5. Did you or any household member eat a smaller meal than you felt you needed because there was not enough food?	0	1	2	3
6. Did you or any household member eat fewer meals in a day because there was not enough food?	0	1	2	3
7. Was there ever no food at all in your household because there were not resources to get more?	0	1	2	3
8. Did you or any household member go to sleep at night hungry because there was not enough food?	0	1	2	3
9. Did you or any household member go a whole day without eating anything because there were not enough resources to get sufficient food?	0	1	2	3
10. Did you or any household member borrow food or go to relatives or friends?	0	1	2	3

11. Did you or any household member sell any of your livestock to buy food?	0	1	2	3
12. Did you or any household member buy foods on credit from a shop?	0	1	2	3
13. Did you or any household member gather and eat wild foods like imifino or fruits?	0	1	2	3
14. Did you or any household member hunt and eat wild animals (bushmeat, also insects and birds)?	0	1	2	3
15. Did you or any household member harvest immature crops?	0	1	2	3
16. Did you or any household member work for food, or rely on casual labour for food? (i.e. work for a "plate")	0	1	2	3

SEASONAL USE OF WILD NATURAL CAPITAL

In the PAST 3 MONTHS, did you or any household member hunt, gather and eat any of the following:	**0= Not in last 3 months; 1 = once a week; 2 = 2-3 times a week; 3 = 4 times a week or more.**			
17. Did anyone eat **bushmeat**?	0	1	2	3
18. Did anyone eat **rats or rabbits**?	0	1	2	3
19. Did anyone eat **birds**?	0	1	2	3
20. Did anyone eat **wild fish or shellfish**?	0	1	2	3
21. Did anyone eat **insects**?	0	1	2	3
22. Did anyone eat **wild eggs**?	0	1	2	3
23. Did anyone eat **wild imifino**?	0	1	2	3
24. Did anyone eat **wild fruit?**	0	1	2	3
25. Did anyone eat **wild roots and tubers?**	0	1	2	3
26. Did anyone eat **wild mushrooms?**	0	1	2	3
27. Did anyone eat **wild nuts?**	0	1	2	3
28. Did anyone eat **wild honey?**	0	1	2	3

HOUSEHOLD 48 hour detailed DIETARY RECALL

I am now going to ask you about foods that you and any members of your household, ate yesterday and the day before yesterday. I am only interested in foods that were eaten here in the household, and not outside the home.

Dietary Probe Instrument

Go through the following dietary probe for each food group. Record in the table overleaf. Yesterday (and then repeat for day-before-yesterday) did you or any members of your household eat ;

GRAINS and CEREALS, *(Examples: Bread, rice, maize products, ujeqe(flour product), corn flakes, cake, porridge, etc.)*
ROOTS and TUBERS *(Examples: sweet potatoes, beetroots, carrots, onions, etc.)*
LEAFY VEGETABLES *(Examples: spinach, imifino (imbuya, uqodolo), cabbage, broccoli, cauliflower.*
FRUIT and FRUITING VEGETABLES *(Examples: aubergine, peppers, tomatoes, apples, guavas, oranges, pears, peaches, bananas, paw-paws, avocados, wild fruit etc.)*
MEAT AND PROCESSED MEAT PRODUCTS *(Examples: beef, chicken, goat, pork, poloney, bushmeat, etc.)*
EGGS *(Examples: from chickens, from wild birds)*
FISH and SEAFOOD (tinned fish, lucky star, pilchards, tuna, frozen fish)
GREEN BEANS AND DRIED BEANS AND ALL NUTS, INCL PEANUTS*(Examples: peanuts, cowpeas, lentils, amabele, beans, etc.)*
MILK and DAIRY PRODUCTS *(Examples: Amaas, milk, powdered milk (NOT cremora), yoghurt, cheese, etc.)*
OILS, FATS, and MARGERINE *(Examples: Holsum, sunflower oil, fishoil, Rama, etc.)*
SUGAR and HONEY*(Examples: sugar, honey, sweets…)*
DRINKS OTHER THAN WATER *(Examples: Coke, beer, coffee, tea, fruit drink, etc.)*
UMUTHI *(Examples: traditional medicines)*
ANYTHING ELSE?

Yesterday **24 HOUR HOUSEHOLD DIETARY RECALL**	**What was eaten?**	**Was it BOUGHT?**	**Was it home GROWN or reared?**	**Was it DONATED?**	**Was it GATHERED or hunted from the wild?**
Breakfast					

Lunch					
Dinner					
Snacks, drinks, muthi					

Day Before Yesterday **48 HOUR HOUSEHOLD DIETARY RECALL**	**What was eaten?**	**Was it BOUGHT?**	**Was it home GROWN or reared?**	**Was it DONATED?**	**Was it GATHERED or hunted from the wild?**

Breakfast					
Dinner					
Snacks, fruit snacks, drinks, muthi (Medicine)					

ATTACHMENT TO MODULE 2: HOUSEHOLD LABOUR (Attached to assessment 2, MONTH 4)

Does your household have access to the following?

				Do you depend solely on rainwater or do you also use other water sources?		If other: Is the water for free?	
Yes	No	Type of land	Are you actively cultivating or using it now?	Rain	Other	Yes	No
1	0	Garden or small plot		1	2	1	2
1	0	Field for cultivation of crops		1	2	1	2
1	0	Field for cultivation of crops		1	2	1	2
1	0	A sugar cane field					

What vegetables did you plant LAST (Spring 2006) season? (tick appropriate box)

Cabbage		Lettuce		Beans		Onions		Turnips	
Potato		Mielie		Swt. Potato		Carrots		Beetroot	
Spinach		Tomatoes		Pumpkin		Peppers		Other	

What vegetables did you plant THIS (Spring 2007) season? (tick appropriate box)

Cabbage		Lettuce		Beans		Onions		Turnips	
Potato		Mielie		Swt. Potato		Carrots		Beetroot	
Spinach		Tomatoes		Pumpkin		Peppers		Other	

Please list all who work in the garden or fields in your household (including children)?

Name	Age	(M) or (F)	How often do they work? 1. 1= daily, 2 = every few days, 3=weekly, 4 = every few weeks, 5 = monthly, 6 = yearly)

How often do you hire someone to work in your garden or fields?

Never	Once a year	Once a month	Once a week or more

How big would you say your vegetable garden is?

Smaller than most others	Same size as others	Larger than most

How big would you say your field is?

Smaller than most others	Same size as others	Larger than most

HOUSEHOLD LABOUR INDEX. How strongly do you agree or disagree with the following statements?

In our house people know a lot about farming

Strong No 1	No 2	Yes 3	Strong Yes 4

We are not short of labour (people who work in the fields or gardens) in our house.

Strong No 1	No 2	Yes 3	Strong Yes 4

In my house we have people who are too sick to work in the garden.

Strong No 1	No 2	Yes 3	Strong Yes 4

We work <u>more</u> in the garden now than we did <u>two years</u> ago.

Strong No 1	No 2	Yes 3	Strong Yes 4

Gardening is too much hard work, it is <u>not</u> worth it in the end.

Strong No 1	No 2	Yes 3	Strong Yes 4

<u>ATTACHMENT TO MODULE 2: SOCIAL CAPITAL (Attached to assessment 3, MONTH 7)</u>

SOCIAL CAPITAL INDEX

How strongly do you agree or disagree with the following statements?

1. People around here are willing to help their neighbours.

Strong No 1	No 2	Yes 3	Strong Yes 4

2. This is a close-knit, or ‘‘tight’’ neighbourhood where people generally know one another.

Strong No 1	No 2	Yes 3	Strong Yes 4

3. If I had to borrow R50 in an emergency, I could borrow it from a neighbour.

Strong No 1	No 2	Yes 3	Strong Yes 4

4. People in this neighbourhood generally get along with each other.

Strong No 1	No 2	Yes 3	Strong Yes 4

5. People in this neighbourhood CAN be trusted.

Strong No 1	No 2	Yes 3	Strong Yes 4

6. If I were sick I could count on my neighbours to shop for groceries for me.

Strong No 1	No 2	Yes 3	Strong Yes 4

7. People in this neighborhood do share the same beliefs, culture and values.

Strong No 1	No 2	Yes 3	Strong Yes 4

8. How long have you lived in your house?

9. How long have you lived in this village?

10. Is anyone in your household a member of any organizations, such as a school council, member of the tribal council, a traditional committee or Sunday school teacher?

Yes 1 What is the organisation? Who is a member of this organisation?	No 0

ATTACHMENT TO MODULE 2: NATURAL CAPITAL (Attached to assessment 4, MONTH 10)

Does ANYONE in this house, buy or sell any of these things?

Resource	Get it myself	Buy	Sell
Firewood			
Housing poles			
Wood for fences/kraals			
Wooden utensils			
Wooden furniture			
Wooden carvings			
Thatch Grass			
Construction reeds			
Weaving reeds			
Grass hand-brushes			
Grass sitting mats			
Fine grass products			
Twig hand brushes			
Wild herbs			

Wild fruit			
Bushmeat			
Honey			
Insects			
Fish			
Mushrooms			
Medicinal plants			

Do you have access to any of the following natural resources

			If yes, how abundant is the resource?	
	Yes	**No**	**The amounts are adequate**	**There is a shortage**
Fuelwood	1	0		
Dams	1	0		
Rivers and streams	1	0		
Fields for grazing animals	1	0		
Thatching grass	1	0		
Grass for weaving	1	0		
Reeds for construction	1	0		
Reeds for weaving	1	0		
River sand for building	1	0		
Clay for crafts and plastering	1	0		
Medicinal plants	1	0		
Edible wild herbs	1	0		
Bushmeat	1	0		