



RHODES UNIVERSITY



Faculty of Science

Department of Environmental Science

Relative contribution of wild foods to individual and household food security in the context of increasing vulnerability due to HIV/AIDS and climate variability

**A thesis submitted in fulfilment of the
requirements for the degree of
Master of Science at Rhodes University**

by

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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 Master of Science at Rhodes University and has not been submitted for a degree or examination at any other university.

ABSTRACT

Wild foods are an integral component of the household food basket, yet their quantified contribution to food security relative to other sources in the context of HIV/AIDS, climate change and variability remains underexplored. This study was carried out in Willowvale and Lesseyton which are rural communities in the Eastern Cape province of South Africa. Willowvale is a relatively remote, medium-rainfall coastal community, while Lesseyton is a peri-urban low rainfall inland community. Qualitative and quantitative methods were used to collect data from 78 HIV/AIDS afflicted households with 329 individuals and 87 non-afflicted households with 365 individuals in the two study sites. Households were visited quarterly over 12 months to assess food acquisition methods, dietary intake and quality, and levels of food security, and to determine strategies employed by households to cope with droughts. The wild foods investigated were wild meat, wild birds, wild fish, wild mushrooms, wild leafy vegetables and wild fruits. Diets were moderately well-balanced and limited in variety, with cereal items contributing 52 % to total calorie intake. Mid-upper arm circumference measurements showed that all respondents were adequately nourished. The bulk of the food consumed by households was purchased, with supplementation from own production, wild vegetables and wild fruits. In Willowvale, wild vegetables comprised 46 % of overall vegetable consumption for afflicted households and 32 % for non-afflicted households, while own fruit production comprised 100 % of fruit consumption. In Lesseyton, wild vegetables comprised only 6 % and 4 % of vegetable consumption for afflicted and non-afflicted households, while wild fruit comprised 63 % and 41 % for afflicted and non-afflicted households. More than 80 % of respondents from both afflicted and non-afflicted households had sufficient daily kilocalories, although the majority of afflicted households felt they were food insecure and sometimes collected wild foods as one of their multiple coping strategies. Hunting and gathering of wild foods was associated with site, household affliction status, gender, age and season. More than 80 % of respondents ate wild vegetables and said they were more drought tolerant than conventional vegetables, making them the most consumed wild food and approximately 16 % of respondents ate wild birds, making them the least consumed wild food. Approximately 14 % of respondents from afflicted households in Willowvale sold wild fish, whilst 34 % of respondents from afflicted households and 7 % from non-afflicted households sold wild fruits in Lesseyton. Strategies adopted by households to cope with droughts were different between the two study sites, and households in Willowvale used a wider range of strategies. Given the devastating effects of HIV/AIDS coupled with the drawbacks of climate change and variability on food security, wild foods represent a free and easy way for vulnerable households to obtain food.

Keywords: HIV/AIDS, climate change, climate variability, food security, wild foods, vulnerable

ABBREVIATIONS

ADM	Amathole District Municipality
AIDS	Acquired Immunodeficiency syndrome
ARDRI	Agricultural and Rural Development Research Institute
ARV	Anti-Retroviral
CHDM	Chris Hani District Municipality
DEAT	Department of Environmental Affairs and Tourism
ECSECC	Eastern Cape Socio-Economic Consultative Council
FANR	Food Agriculture and Natural Resources
FAO	Food and Agriculture Organization
GIS	Geographic Information Systems
HDDI	Household Dietary Diversity Index
HDDS	Household Dietary Diversity Score
HIV	Human Immunodeficiency Virus
HKI	Helen Keller International
HSRC	Human Sciences Research Council
IDDI	Individual Dietary Diversity Index
IDDS	Individual Dietary Diversity Score
IDP	Integrated Development Plan
IDRC	International Development Research Centre
IFRC	International Federation of the Red Cross and Red Crescent Societies
IPCC	Intergovernmental Panel on Climate Change
Kcal	Kilocalories
MDG	Millennium Development Goal
MUAC	Mid-Upper Arm Circumference
NGO	Non Governmental Organization
NSNP	National School Nutrition Programme
NTFP	Non Timber Forest Products
RDP	Reconstruction Development Programme
RU	Rhodes University
SADC	Southern African Development Community
SASSA	South African Social Security Agency
SE	Standard Error
VAC	Vulnerability Assessment Committee
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Funds
USDA	United States Department of Agriculture
WFP	World Food Programme
WHO	World Health Organization

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CHAPTER 1

INTRODUCTION



“From the time I lost my husband, son and daughter, it is difficult for me to put food on the table for my grandchildren to eat. Sometimes we go hungry and eat food we do not like because I have no option”.

Ntombomzi, 65 year old widow, Willowvale

1.1 Food security

The Food and Agriculture Organisation (FAO) defines food security as “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences, for a healthy and active life” (FAO 1996). However, food security is multi-faceted with various environmental, social, political and economic determinants (Pinstrup-Andersen 2009, Ericksen 2008). At the household level, food security represents the ability of the household to secure enough food to ensure adequate dietary intake of preferred foods for all members. Food security covers four aspects, namely:

- i. Availability - the supply of food;
- ii. Access - the ability of an individual or household to obtain that food;
- iii. Utilisation - the ability of a person to select, take-in and absorb the nutrients in the food;
and
- iv. Vulnerability - the physical, environmental, economic, social and health risks that may affect availability, access and use (WFP 2007).

Food security has been widely used at the household level as a measure of human welfare, and attempts have been made to make the concept operationally useful in the design, implementation, and evaluation of programs, projects and policies (Pinstrup-Andersen 2009). ‘Safe and nutritious’ emphasise food safety and nutritional composition while ‘food preferences’ shifts the definition of food security from mere access to any food to the food preferred (Pinstrup-Andersen 2009). This implies that individuals or households with equal access to food, but different food preferences, could be experiencing different levels of food security (Arnold *et al.* 2011). Secondly, food insecure households may live in a community where there is sufficient food in total, but lack income or buying power to purchase the food required by the household (Arnold *et al.* 2011).

Market access is also essential in ensuring food security for all but the remotest of rural communities. With good market access, people with adequate income in high-income countries can be food secure because they are able to purchase all the food they need (Sunderland 2011). In contrast, in countries such as India, despite sustained growth in agricultural productivity, have a high proportion of food insecure people because of poverty and social disparities (Sunderland 2011). Food insecurity is defined by the World Food Programme (2007) as “hunger that is caused by problems with availability, access, use or vulnerability or any combination of them”. The causes of food insecurity are varied and differ with the level of analysis which can either be regional, household or individual (Figure 1.1). These varied and dynamic causes call for holistic approaches to alleviate global food insecurity.

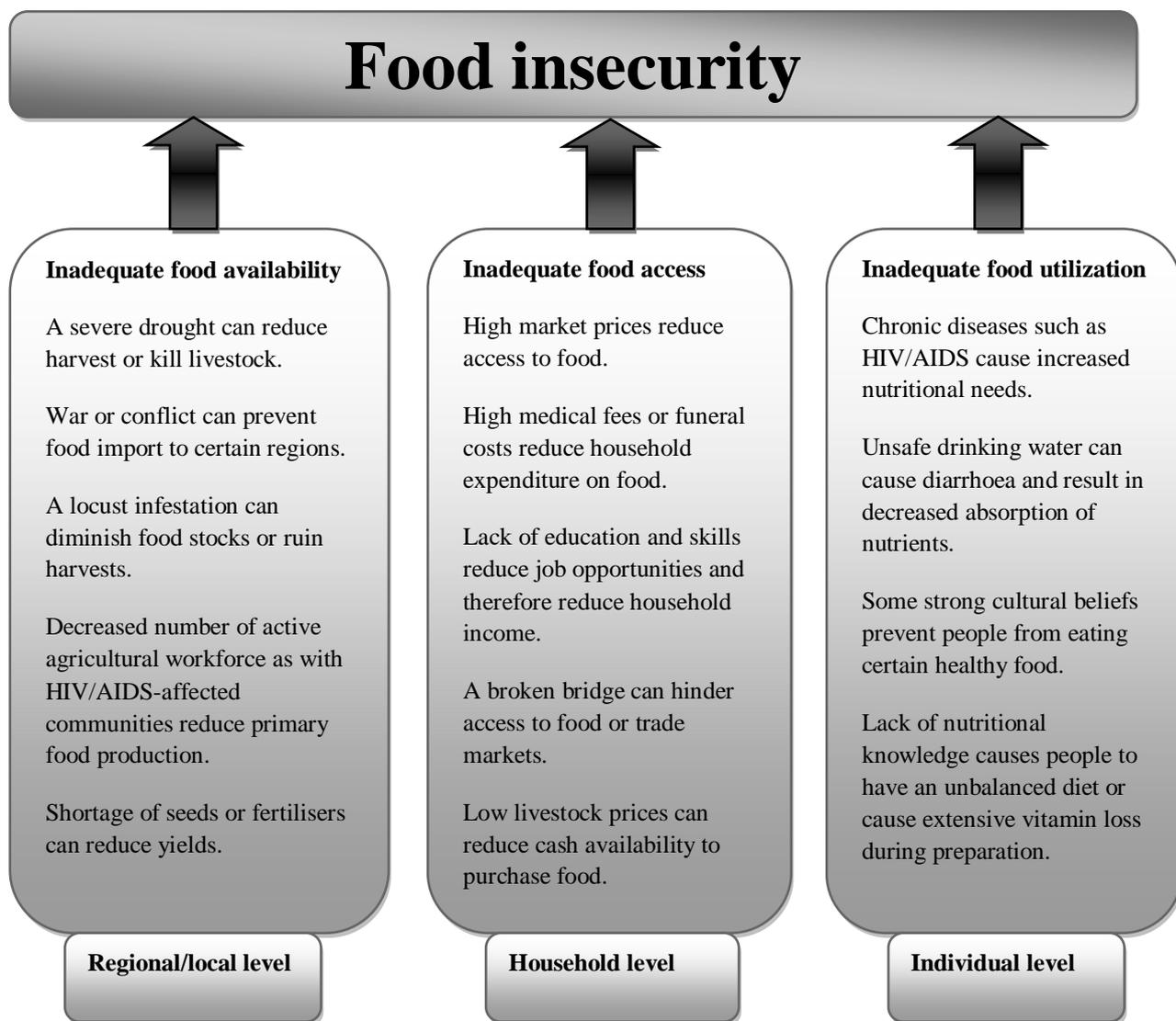


Figure 1.1 Examples of causes of food insecurity at different scales

Adapted from: IFRC (2006)

Food insecurity can be classified as either transitory or chronic. Transitory food insecurity is a short-term decline in access to food due to factors such as instability of food prices or crop failure (WFP 2007, IFRC 2006). Chronic food insecurity is a pronounced, long-term inadequate diet caused by a continual inability of individuals or households to meet their food requirements (WFP 2007, IFRC 2006).

The world today has adequate global food supplies yet the number of food insecure people in developing countries, especially in Africa has been increasing since the mid 1990s (Salami *et al.* 2011). In 2010, approximately 925 million people were estimated to be malnourished globally and in sub-Saharan Africa, 239 million people were chronically food insecure, representing 30

% of the global population (WFP 2010). Out of the 30 food insecure countries globally, 20 African countries were in need of food aid because of natural disasters, crop failure, conflict and other factors (Salami *et al.* 2011). With these very high numbers of food insecure people in the world, the FAO (2010) concluded that the achievement of Millennium Development Goal (MDG) number one, which is to halve extreme poverty and hunger by 2015 (UN 2000), was impossible to achieve. Food prices have been increasing since mid-2010 and this together with high HIV/AIDS prevalence, climate change and variability has worsened food insecurity in Africa particularly for the poor (Salami *et al.* 2011). It is however important to note that while food insecurity may be caused by natural hazards such as drought and floods, long term socio-economic factors such as poverty and HIV/AIDS also play a critical role in exacerbating food insecurity and increasing the vulnerability of rural households (Drimie and Gillespie 2010, Masuku and Sithole 2009, Ericksen 2008).

In 2012 the FAO presented new estimates of food insecure people in the world based on a revised and improved methodology. Overall, there was a 6 % decrease in the number of food insecure people in the world between 2010 and 2012 (Table 1.1).

Table 1.1: Numbers of food insecure people in 2010 and 2012 in each region

Region	2010 (millions)	2012 (millions)
Asia Pacific	578	536
Sub-Saharan Africa	239	234
Latin America & Caribbean	53	49
North Africa	37	33
Developed countries	19	16
Total	926	868

Source: FAO 2010, FAO 2012

With the above figures the FAO concluded that “progress in reducing hunger during the past 20 years has been better than previously believed and given renewed efforts, it may be possible to reach the MDG hunger target at the global level by 2015. However, the number of people suffering chronic undernourishment is still unacceptably high, and eradication of hunger remains a global challenge”. Thus, the need to develop a more thorough understanding of the primary causes of food insecurity cannot be over emphasised. This means untangling the multiple stressors which lie at the root of food insecurity and manifest themselves either as abrupt shocks such as HIV/AIDS, or gradually such as climate change and variability (Drimie and Casale 2009).

1.2 Wild foods consumption by rural households

Wild foods are non-domesticated species of flora and fauna that are gathered or hunted by humans for consumption (Muller and Almedon 2008, Gockowski *et al.* 2003). In South Africa, wild foods include varied forms of both plant and animal derived products that include fruits,

green leafy vegetables, woody foliage, bulbs and tubers, cereals and grains, nuts and kernels, saps and gums which are eaten or used to make wine, mushrooms, invertebrates such as insects and snails, honey, bird eggs, bush meat from small and large mammals, reptiles, birds, fish and shellfish (Shackleton *et al.* 2010). Wild foods are an essential and preferred dietary component in many rural and urban households throughout the world. In the past, the diets of hunter-gatherer communities were solely composed of wild foods (Bharucha and Pretty 2010), whereas today, most communities are agro-pastoralist, and typically have access to diverse food sources which include home grown, wild collected and purchased.

It is estimated that close to one billion people in the world consume wild foods (Aberoumand 2009). Uses of wild foods vary from place to place with some being used frequently, others less frequently and others only in times of drought or as famine foods (Oluoch *et al.* 2009). For example, the Yanomani Indians in Venezuela regularly use 20 wild plant species in their diets but when they are faced with food shortages, they consume an additional 20 species which they do not use during normal times (Fentahun and Hager 2009). In Botswana, when there is crop failure due to drought, wild fruits provide a food security fall back for households to use until conditions improve (Mojeremane and Tshwenyane 2004). In Zimbabwe, poor rural households increase the quantities of wild fruits they consume and sell to generate income for household food expenditure (Mithöfer and Waibel 2004). In Zambia, wild foods such as wild mushrooms, wild fruits, wild leafy vegetables, tubers, edible insects and honey that are found in the miombo woodlands enrich the starch based diets and improve food security for most rural communities (Jumbe *et al.* 2008).

Diets of the Turumbu people in the Democratic Republic of Congo are mainly composed of cassava which they grow and are supplemented with wild foods such as wild leafy vegetables, bush meat, wild fish, wild mushrooms, caterpillars, ants and honey depending on the season (Termote *et al.* 2010). The main source of fat for the Turumbu people is palm oil which is a wild plant (Termote *et al.* 2010). Findings by Kümpel *et al.* (2010) in Equatorial Guinea showed that bush meat contributed significantly to household meat consumption. From the bush meat caught, 89 % was sold, 11 % was for household consumption and 66 % of male respondents hunted bush meat for income. Across a sample of 14 rural villages in South Africa, on average, 96 % of households consumed wild spinaches, 88 % ate wild fruits, 54 % ate edible insects, 52 % consumed bush meat and 51 % ate honey (Shackleton and Shackleton 2004). This shows that a significant number of rural households access some form of nutritional and dietary benefit from the consumption of wild foods.

It is not just rural communities that make use of and even prefer wild foods. There are vibrant urban markets in many kinds of wild foods to supply burgeoning urban populations. A few

examples include wild vegetables in West Africa (Weinberg and Pichop 2009, Mertz *et al.* 2001), bush meat in central Africa (van Vliet *et al.* 2012, Edderai and Dame 2006) and mopane worms in southern Africa (Greyling and Potgieter 2004). These examples show that the consumption of wild foods is not driven solely by need or poverty, but also by culture, tradition and preference. Additionally they are not used just as a safety net in time of need, but are consumed by those who have the means to afford them.

More than 33 % of the African population is poverty stricken and lives on less than US\$1 per day (Salami *et al.* 2011). Food insecurity is rampant in Africa because people cannot afford to buy adequate food due to the ever increasing and volatile food prices (FAO 2012). Therefore most rural households and a significant proportion of urban households depend on wild foods to satisfy part of their food, nutritional, health and livelihood needs (Arnold *et al.* 2011). Wild foods are sold in urban markets either dried or fresh and some urban dwellers grow them in their backyard gardens. In South Africa, Cocks (2006) found that both poor and wealthy urban households consumed wild vegetables, with the poorer households consuming significantly more. Wild foods rarely make up most of the staple items in individual and household diets, yet in many rural households wild foods supplement what they obtain from own production and purchase in three major ways:

- They provide a free variety of nutritious foods that are high in micronutrients and fibre and low in sodium, refined sugar and fat (Arnold *et al.* 2011, Kaschula 2008);
- They are often of cultural importance and contribute significantly to local food systems (Arnold *et al.* 2011);
- They are important for food security and poverty alleviation because they assist households through seasonal food gaps and act as a ‘safety net’ or ‘fall back’ when conventional food resources are scarce due to drought, crop failure, illness, civil unrest or other kinds of household shocks (Arnold *et al.* 2011, Pasquini *et al.* 2009); and
- They are cost efficient to collect and save households time and money (Delang 2006).

This shows that food security goes beyond the viability of agriculture and includes wild foods which are collected from surrounding natural ecosystems (King 2011).

1.3 Wild foods and HIV/AIDS

Humans are exposed to a number of challenges and terminal health risks that increase their vulnerability such as HIV/AIDS. People are said to be vulnerable if they are expected to be unable to cope with a defined hazard (O’Brien *et al.* 2009). The complicated nature of vulnerability, coupled with the differences within and between communities, shows that different individuals and households can experience different intensities, types, frequencies and durations of shocks and stresses which lead to vulnerability (Paumgarten and Shackleton 2011).

Vulnerability is a term that is used to describe multiple stressors and more broadly, the worsening livelihoods of many rural households in southern Africa (Shackleton and Shackleton 2012, Drimie and Casale 2009). Definitions of vulnerability are many and variable between and within disciplines (Fussel 2007, O'Brien *et al.* 2004). However, the most commonly used and accepted definition of vulnerability is that given by Chambers (1989): “Vulnerability refers to exposure to contingencies and stress and means for coping with them. Vulnerability thus has two sides: an external side of risks, shocks and stress to which an individual or household is subject and an internal side which is the means for coping without damaging loss”. The external side of vulnerability is caused and influenced by interacting biophysical and socio-economic factors such as urbanisation, diseases, conflict, economic globalisation and environmental changes (Drimie and Casale 2009). On the other hand, the internal side of coping is not well understood because coping is multi-dimensional, contextual and dynamic (Drimie and Casale 2009). Poverty increases household vulnerability and vulnerability hinders the ability of households to accumulate assets necessary for a sustainable livelihood, therefore driving households into a downward spiral of chronic poverty (Parker and Kozel 2005).

According to the SADC FANR VAC (2003), HIV/AIDS greatly affects food security in southern Africa and it has increased the vulnerability of rural communities by worsening the problems they already face though the extent of these challenges has not been quantified. However, the intensity of the problems caused by the pandemic differ depending on the socio-economic and environmental aspects of the community in question hence these cannot be analysed collectively in any one country (Masuku and Sithole 2009). Studies done in rural communities in Zambia (Chapoto and Jayne 2008), Kenya (Gill 2010, Nguthi and Niehof 2008, Yamano and Jayne 2004), Tanzania (Challe and Price 2009, Hosegood *et al.* 2007a), Uganda (Parker *et al.* 2009) and South Africa (McGarry and Shackleton 2009, Kaschula 2008) showed significant variations within and between communities with regards to the impacts of HIV/AIDS on food security. Such disparities indicate that there is a need to disaggregate analyses based on spatial and temporal scales (Masuku and Sithole 2009). Agro-ecological, geographic and socio-economic conditions for example, determine the levels of vulnerability and intensity of shocks such as HIV/AIDS, on food security; and ultimately the interventions that can be used to alleviate food insecurity (Drimie and Casale 2009, Masuku and Sithole 2009).

The global estimate for people living with HIV/AIDS in 2011 was 34 million, with sub-Saharan Africa being the most affected region having 23.5 million or 69 % of the global estimate of the HIV-positive population, yet it is home to only 10 % of the world's population (UNAIDS 2012). Households most affected by HIV/AIDS in sub-Saharan Africa are heavily reliant on subsistence agriculture for food provision and hence the effects of the pandemic have created

long-term food security challenges for these households (Chapoto and Jayne 2008). HIV/AIDS not only affects those infected by it but also hinders social and economic development at the household, regional and national levels because resources are channelled to awareness, prevention and treatment efforts (Parker *et al.* 2009).

AIDS weakens the immune system and increases the risk of attack by opportunistic infections (UNAIDS 2009). In 2011, 1.7 million HIV/AIDS related deaths were recorded globally and of these, 1.2 million were in sub-Saharan Africa (UNAIDS 2012). Sub-Saharan Africa is also characterised by high levels of food insecurity (WFP 2002), dependence on wild foods and natural resources for rural livelihoods (Shackleton and Shackleton 2011) and variable climatic conditions (FAO 2009). The high prevalence of HIV/AIDS affects all aspects of food security - access, availability, utilisation and vulnerability (Twine and Hunter 2011), and Kaschula (2008) unequivocally states that “the long-term effects of HIV/AIDS on development issues including food security are still not fully understood, but preliminary indications are alarming”.

South Africa has an estimated population of 50.6 million (Stats SA 2011) and has the highest number of people in the world living with HIV/AIDS (UNAIDS 2012). The country has approximately 5.6 million people (11.1 %) living with HIV/AIDS and in 2011, 270 000 HIV/AIDS related deaths were recorded (UNAIDS 2012). The vicious and sometimes irreversible effects of HIV/AIDS are complex and therefore the pandemic cannot be viewed from a human health perspective only, but needs a more holistic outlook as it affects the social, economic, environmental and institutional aspects of rural and urban livelihoods (Masuku and Sithole 2009, Hosegood *et al.* 2007b). MDG number six is to reduce HIV/AIDS related deaths, together with other diseases such as malaria, in developing countries because they have had a tremendous effect on populations and economies (Easterly 2009, UN 2000). Despite the decrease in HIV/AIDS prevalence and deaths in some regions due to the availability of anti-retroviral drugs (ARVs), recent findings show that HIV/AIDS continues to exacerbate the already existing economic and social challenges in affected households (Parker *et al.* 2009, Russell *et al.* 2007). Evidence from Bloem *et al.* (2010) and Anema *et al.* (2009) suggests that the effectiveness of ARV treatment decreases with inadequate food intake and poor nutrition which is common in HIV/AIDS afflicted households.

HIV/AIDS disproportionately increases household vulnerability because it mostly affects the sexually active age groups who are the most economically active, with opportunistic infections leading to chronic illness and eventual death of these household members if not treated with anti-retroviral drugs (Twine and Hunter 2011). Such losses leave households vulnerable to other social hazards, which may be difficult to cope with, such as an increase in the number of orphans. However, in wealthy households, an increase in the number of orphans may not

significantly affect household food security (O'Donnell 2004). Chronic illness also leads to loss of income and a reduction in agricultural productivity because the ill person cannot work and productive household members spend time caring for them (Twine and Hunter 2008). In addition, the need to pay for medical services or funeral expenses decreases the income available for household expenditure on food and increases the need for households to sell their assets, such as livestock, for income thus pushing them into deeper poverty and food insecurity (Shackleton and Shackleton 2012, Masuku and Sithole 2009).

Shocks such as HIV/AIDS retard household social and economic development thus jeopardising livelihood sustainability (Gillespie 2007). In addition to social and economic impacts, research has shown that HIV/AIDS is also altering ecological systems, by increasing the pressure and reliance on natural resources (Bolton and Talman 2010, Hunter *et al.* 2008, Kaschula 2008) which may have wider effects on ecosystems functioning (McGarry and Shackleton 2009, Aldhous 2007). Evidence from numerous regions of the world shows that wild foods are indispensable to the most vulnerable individuals and households in rural communities (Arnold *et al.* 2011). McGarry and Shackleton (2009) suggest that households that have lost a breadwinner may increase their consumption and reliance on wild foods as a coping strategy, thus echoing the findings of Twine and Hunter (2011) and Hunter *et al.* (2008). Vinceti *et al.* (2008) also point out that, individuals and households that are vulnerable to food insecurity, hunger and malnutrition, have the highest dependence on forest products for food and income.

1.4 Climate change, variability and food security

Humans are dependent on the natural environment for the provision of goods and services that ensure healthy and active lives (MA 2005). However, in the modern and technologically advanced world one may be quick to conclude that humans are independent of the natural environment yet this is not the case (Wlokas 2008). Humans are part of the environment and require environmental goods and services for survival and wellbeing (MA 2005). The past decade has seen an increasing concern over the changes in climate which are set to cause major shifts on all aspects of human livelihoods and food security. However, in an endeavour to develop a clear understanding of the impacts of climate change and variability on food security, it is crucial to define what these phenomena are.

Climate change is “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (UNFCCC 2011). On the other hand, climate variability refers to “variations in the mean state and other climatic statistics on all temporal and spatial scales beyond those of individual weather events” (UNFCCC 2011). Variability may be due to natural internal processes within the climate system (internal

variability) or from natural or anthropogenic external forces (external variability) (UNFCCC 2011). The above definitions distinguish between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes (IPCC 2007).

Climate change is a widely recognised global and regional challenge whose deleterious effects have been predicted to greatly affect global food security (Benhin 2008). Sub-Saharan Africa and Asia Pacific have the highest proportion of food insecure people in the world (FAO 2012). These two regions are characterised by large rural populations, poverty and low agricultural productivity due to declining resource bases, poor market networks and high climatic variability (Vermeulen *et al.* 2012). Africa is one of the most vulnerable continents to climate variability and change because of the presence of multiple stressors and its low adaptive capacity (IPCC 2007). Generally, the livelihoods of people in the continent are directly linked to land and natural resources which are dependent on the climate of the area; hence any changes in the climate can have marked effects on local livelihoods (IPCC 2007, 2001). In Africa, 95 % of agriculture is entirely rain fed, which increases the vulnerability of the sector to climate change (Nord and Luckscheiter 2011). It is predicted that in southern Africa, which already has water shortages, climate change will cause high temperatures and a decline in rainfall which will lead to a reduction in agricultural production (IPCC 2007, DEAT 2004). Declines in agricultural production will exacerbate the already existing food security and malnutrition challenges; and possibly lead to sharp increases in food prices (Nord and Luckscheiter 2011).

The fisheries sector is also predicted to suffer the effects of climate change and variability because the distribution and productivity of fish is influenced by climate (Vollmer *et al.* 2007). Rural and small-scale fishermen make up more than 90 % of the world's fishers and fish traders and climate change will adversely affect their livelihoods (Badjeck *et al.* 2010). The effects of climate change and variability are already evident in the African lakes with reduced fish productivity because of rises in atmospheric temperatures and the increases in the intensity of coral bleaching due to rises in sea surface temperatures (Munday *et al.* 2008). Coral bleaching changes the diversity, size and composition of fish communities in coastal areas (Pratchett *et al.* 2008). Climate change and associated variability is predicted to cause increasing global water stress and affect the lives of approximately 75 to 250 million people by 2020 (Conway *et al.* 2009, Kundzewicz *et al.* 2008). In terms of human health, climate change is predicted to increase the occurrence of vector borne diseases such as malaria, yellow fever and bilharzia in the tropics (Lafferty 2009, Ramin and McMichael 2009).

Paumgarten and Shackleton (2011) showed that in the Eastern Cape and Limpopo Provinces of South Africa, 72 % of households employed a change in their food consumption patterns as a

coping strategy for different types of shocks they experienced. Changes in food consumption patterns and overall diets are mostly associated with a significant increase in the consumption and utilisation of wild foods (Challe and Price 2009, McGarry and Shackleton 2009, Hunter *et al.* 2008). The adverse effects of climate change and variability are exacerbated when they are combined with HIV/AIDS, because they expose rural households to more intense challenges and vulnerabilities with which they must cope and many a time they lack the capacity to do so (Shackleton and Shackleton 2012, O'Brien *et al.* 2009). The manner in which households respond to stressors such as HIV/AIDS, climate change and variability varies, depending on the frequency, nature and intensity of the shock as well as other household attributes such as asset base and social networks (Paumgarten and Shackleton 2011). Akrofi *et al.* (2012) showed how food security coping strategies varied between the agricultural and non-agricultural seasons amongst HIV/AIDS affected households in relation to non-affected households. Affected households invoked a wider variety of food consumption coping strategies and a greater proportion did so.

1.5 Justification for study

Although development and social studies in Africa recognise the importance of subsistence agriculture for household food security, they frequently overlook or underestimate the contribution of wild foods (Bharucha and Pretty 2010, Ericksen *et al.* 2009). The exclusion of wild foods can be attributed to inadequate information on their nutritional content (Yang and Keding 2009) and underestimation of their potential to contribute to food security (McBurney *et al.* 2004). Wild foods are an integral part of the household food basket, yet the empirical documentation of their quantified contribution to individual and household food security relative to other food sources, in the contexts of HIV/AIDS climate change and variability is scarce (Kaschula 2008).

Contemporary literature on the impacts of HIV/AIDS on food security places significant emphasis on the household as the unit of investigation. This tends to reduce the focus on other pertinent aspects of the household such as age, gender, intra-household relationships and social networks which directly affect household food acquisition strategies (Kaschula 2011). The independent effects of HIV/AIDS and, climate variability on food security in sub-Saharan Africa and globally are receiving increasing research attention yet to my knowledge there is no research on their combined impacts on food security and livelihood strategies. HIV/AIDS and climate change are two critical long-term challenges and though they both increase the vulnerability of rural households to food insecurity, their mutual links have received little analysis (Shackleton and Shackleton 2012, Drimie and Gillespie 2010, Ziervogel and Drimie 2008).

With mounting evidence of the impacts of climate change and variability on food security, the resulting impacts on the availability of wild foods to rural households made vulnerable by HIV/AIDS are likely to be significant, but remain a poorly researched area in climate adaptation policy. It is imperative therefore, to develop a clear understanding of the drivers and determinants of food security, especially in relation to wild foods in the contexts of HIV/AIDS, climate change and variability. This contextual research on wild foods and food security will not only add value to the already existing knowledge but will also assist in the development of policies and programmes that will help vulnerable rural households alleviate food insecurity.

1.6 Objective and key questions

The broad objective of this research is to determine the relative contribution of wild foods to individual and household food security in rural communities, in the context of HIV/AIDS and climate variability. The key research questions were:

1. What is the relative contribution of different food sources to individual and household diets in terms of intake and diversity, with particular emphasis on wild foods?
2. What are peoples' perceptions of wild foods?
3. What are peoples' perceptions and experiences of food security?
4. What impacts does HIV/AIDS have on individual and household consumption and use of wild foods?
5. What impacts does climate variability have on individual and household consumption and use of wild foods?
6. What are the combined effects of HIV/AIDS and climate variability on individual and household consumption and use of wild foods?

1.7 Study sites

The study was carried out in the Eastern Cape province of South Africa (Figure 1.2) in two areas: Lesseyton which is an inland area in Lukhanji Local Municipality, and Willowvale which is a coastal area in Mbhashe Local Municipality.

The Eastern Cape, which is on the south eastern South African coast, is the second largest province in South Africa, covering 13.9 % of the country's landmass (Mucina and Rutherford 2006). Most of the Eastern Cape (97 %) is classified as dry land, and of the seven different biomes: Grassland, Nama Karoo, Thicket and Savanna are the most extensive (Mucina and Rutherford 2006). The Eastern Cape has an estimated population of 6.83 million representing 13.5 % of the total population. It is the poorest province in South Africa, with a largely rural population and the lowest rates of services and infrastructure development (Stats SA 2011). The Eastern Cape is highly heterogeneous with two extremely contrasting landscapes. The western part of the province is more developed and well administered compared to the former homelands in the eastern part which are characterised by informal settlements, small towns and villages that are poorly administered and poverty stricken (Makiwane and Chimere-Dan 2010, Bank and Minkley 2005).

The leading causes of death in the province are HIV/AIDS related opportunistic infections such as tuberculosis, with approximately 41.9 % of deaths related to HIV/AIDS recorded in 2009 (Makiwane and Chimere-Dan 2010, ECSECC 2009, UNAIDS 2009). In 2011, HIV/AIDS prevalence was estimated to be 29.9 % among the adult population (RSA 2012). Livelihoods in the rural areas of the Eastern Cape are similar to those in other communal areas of the country being typically composed of a combination of subsistence agriculture, livestock rearing, petty trading, wage employment, social grants, remittances, gathering of non-timber forest products and inter-household transfers (Shackleton and Shackleton 2004). Subsistence agriculture is the dominant activity and the province has high levels of land degradation due to heavy grazing and unsustainable agricultural practices, which have a negative impact on the delivery of ecosystem services and reduce natural productivity over time (DEAT 2006).

Coastal regions and ecosystems are the most vulnerable to climate change and variability (Gbetibouo and Ringler 2009, Agardy and Alder 2005). Rainfall patterns in the Eastern Cape are highly variable (300 mm – 1 200 mm), making it one of the three most vulnerable provinces to climate change and variability in South Africa together with the Western Cape and KwaZulu-Natal provinces which are also coastal (Gbetibouo and Ringler 2009). As climate change advances, inland areas are predicted to get hotter and drier, while the coastal zone is expected to experience an increase in late summer rainfall, floods and rising sea levels (DEAT 2004).

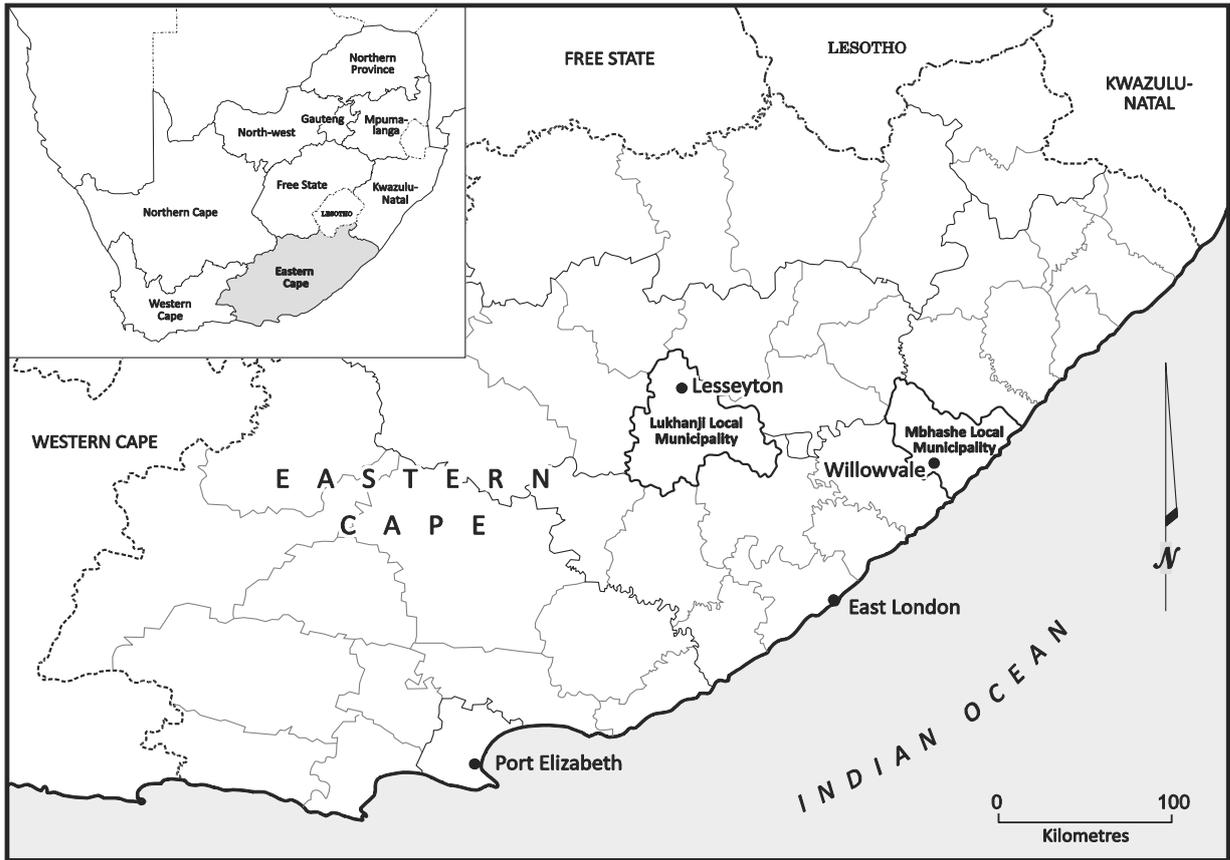


Figure 1.2: Location of the two study sites: Lesseyton and Willowvale

The Eastern Cape has experienced severe droughts in recent years (Gbetibouo and Ringer 2009), of which the two study sites were no exception. The rural people of the Eastern Cape are some of the most vulnerable in South Africa as their livelihoods have been impacted by multiple stressors: predicted climate change impacts, HIV/AIDS prevalence, high levels of poverty, poor access to basic services and ecosystem degradation (IDRC and RU 2010).

1.7.1 Lesseyton

Lesseyton is a peri-urban village that is located 15 kilometres west of Queenstown in Lukhanji Local Municipality (Table 1.2) which falls under the Chris Hani District Municipality (CHDM).

The terrain is generally hilly and the soils are of the Karoo sequence which are poorly developed and shallow and therefore not suitable for crop production (CHDM IDP 2010). Mean annual rainfall is less than 400 mm hence the area is classified as being arid to semi-arid (Mucina and Rutherford 2006). The area has very limited access to water causing frequent interruptions to the piped water system which hinders the growing of crops and livestock farming (CHDM IDP 2010).

Table 1.2: The socioeconomic and biophysical aspects of Willowvale and Lesseyton

Characteristic	Coastal Site	Inland Site
	Willowvale	Lesseyton
District Municipality	Amathole	Chris Hani
Local Municipality	Mbhashe	Lukhanji
Area	3 030km ² *	4 387km ² **
Local service area	Willowvale	Queenstown
Coordinates	32°15'46.33"S, 28°28'50.15"E	31°50'40.96"S, 26°46'34.18"E
Former homeland	Transkei	-
Average Annual Rainfall ***	1 100mm p.a.	<400mm p.a.
Vegetation***	Transkei Coastal Belt	Queenstown Thornveld
Total Population of Local Municipality (2001)	255 071 *	184 452 **
Total Population of Local Municipality (2007)	262 008 *	208 081 **
Population Density	26.1 persons/km ² *	47.4 persons/km ² **
Gender: Male	44.5 % *	48 % **
Female	55.5 % *	52 % **
People living in poverty	90.4 % *	65 % **
Human Development Index	0.41*	0.55**
Household Income <R1 500/month	96 % *	45 % **
Unemployment	78.5 % *	50 % **
Dependent on social grants	66 % *	57 % **
HIV Prevalence (2008) ****	26.5 %	29 %
Functional Literacy	44.2 % *	54 % **
Household Size	4.4*	4.1**
Type of energy used for cooking, heating, lighting	Paraffin, Fuel wood, Gas	Electricity, Fuel wood

Sources: * Mbhashe Municipality 2010, ** Lukhanji Municipality 2011, *** Mucina and Rutherford 2006, **** ECSECC 2009

Lesseyton is made up of eight villages which were all sampled in the study and these are: Ekuphumleni, Engonjini, Tabata, Toisekraal, Trust, Vrijin, Xuma and Zola. The N6 highway passes through Lesseyton therefore transport is not a challenge. There are a number of shops in the community that sell a variety of household items at fairly reasonable prices. In terms of

housing, Lesseyton has both formal, mostly government Reconstruction and Development Programme (RDP) houses and informal housing with every household having access to a ventilated pit latrine. Residents have access to electricity, tap water and those in RDP houses also have rainwater tanks. Lesseyton residents access most of their financial, health and administrative services in nearby Queenstown.

People are highly dependent on government social grants (Table 1.3) and remittances as the main sources of income and farming is not a major source of food because a greater portion of their income is spent on food purchases (CHDM IDP 2010).

Table 1.3: Types of social grants paid out to beneficiaries

Grant Type	Amount (R)/month
Old Persons Grant (Old age pension)	1 140
Old Persons Grant (Old age pension): Beneficiary older than 75 years	1 160
Disability Grant	1 140
War Veterans' Grant	1 160
Grant-in-aid	260
Child Support Grant	260
Foster Child Grant	740
Care Dependency Grant	1 140

Source: SASSA 2012

All government social grants are paid out to South African citizens or permanent residents that are eligible and have the correct documents. The grants for older persons are paid out to people above the ages of 60 years and 75 years. The war veterans' grant is paid out to people above the age of 60 years who fought in the second world war or the Korean war whilst the grant in aid is given to recipients of grant for older persons, disability grants or a war veteran's grant who require full time attendance by another person owing to their physical or mental disability. Disabled persons between the ages of 18 and 59 years are paid a disability grant and children under the age of 18 years receive a care dependency grant. Child support and foster care grants are for children born after 31 December 1993 whose parents or guardians have no form of income. However, for a child to receive a foster care grant, a court order indicating foster care status is required before the grant is paid out to the beneficiary.

1.7.2 Willowvale

The second study site is an area characterised by dispersed villages from outside the town of Willowvale down to the coast in Mbhashe Local Municipality (Table 1.2) in the Amathole District Municipality (ADM). Mbhashe Local Municipality has an estimated population of 262 008 people (Stats SA 2009a).

ADM stretches from the Indian Ocean coastline in the south to the Amathole Mountains in the north and includes the larger parts of the former Ciskei and Transkei homeland areas, hence the

large differences within its borders (ADM IDP 2010). The general terrain of the area is uneven with many deeply incised valleys (Andrew 2003). Soils in the Transkei coastal belt are derived from the Beaufort and Ecce series of the Karoo system (Palmer *et al.* 2002). They are poorly developed, and are phosphate and potassium deficient which makes them infertile. Waterlogging is common during the rainy season followed by desiccation during the dry season (Timmermans 2004). High rainfall causes leaching and increases the acidity of the soil thus making the conditions unfavourable for crop production (Timmermans 2004).

Willowvale is in the former 'homeland' areas of the Transkei. The area is largely underdeveloped with the majority of the population living in rural settlements (Stats SA 2009b). It is one of the poorest districts in the country (Stats SA 2000), hence the utilisation of natural resources and livestock rearing contributes immensely to local livelihoods (Palmer *et al.* 2002, ARDRI 2001). The previous homeland governments of the Ciskei and Transkei promoted household food security and provided communal farmers with tractors to till the land and inputs such as seed (Bank and Minkley 2005). Areas in the former Transkei have been characterised by a significant decrease in food production over the years, thus leading to an increased dependence on state welfare grants, migrant labour and remittances (Timmermans 2004, Ngcaba 2002).

The study was carried out in eight more or less contiguous villages that stretch 10km from Willowvale town going down to the coast. The villages sampled were Bonde, Bojini, Qhora, Qwaninga, Ngxutyana, Ncalukeni, Nakazana and Gojela. Most people in the eight villages live in typical Xhosa rural homesteads that are made up of a house or houses, thatched round hut which is used as the kitchen, outside courtyard, a kraal (livestock pen) and fenced garden. Daily household chores include water collection from communal taps, firewood collection, attending to livestock and tending the garden. There are a number of shops in the villages that sell a variety of household items. The eight villages are connected by a gravel road that is graded regularly but degrades easily because of the rain and the volume of traffic that use it. Transport costs are higher on gravel roads for the same distance on tarred roads due to the high vehicle maintenance costs created by poor road conditions (Andrew and Fox 2004).

Social grants are paid out once a month and these are brought to the community by the South African Social Security Agency (SASSA) (Table 1.3). Traders from Willowvale town also come at the same time to sell their goods hence most people do their monthly shopping at the time of the grant pay-outs. Some people opt to go to town once a month, not only to do their shopping, but to also access medical and other services. Areas of the Eastern Cape province that were formerly known as the Transkei were typically known for labour migration to distant urban areas and household food production (Andrew and Fox 2004). There have been some

major changes in the livelihood portfolios for people living in these areas. In the last decades, migrants have been faced with challenges of unemployment in urban areas and this means that the remaining household members have reduced or no access to remittances from the migrant household members thus increasing dependence on social welfare grants (Bank and Minkley 2005). Many of the people in the Willowvale area are poor and rely on diverse livelihood strategies including both off-farm and land-based activities (Stats SA 2008, Andrew 2003, Stats SA 2000).

There has also been a significant change in household food production systems in the last half century, with an increase in production in homestead gardens and a decrease in production in fields that are located some distance from the homestead (Andrew and Fox 2004). Some households do not cultivate their fields or gardens at all, but instead focus on collecting wild vegetables that grow in gardens and between homesteads. Those that cultivate their fields and gardens grow a variety of vegetables all year and seasonal crops such as maize, beans, squashes and pumpkins. Cultivation can be done by hoes or ploughs that are drawn by oxen, horses or mules or sometimes by tractors depending on the availability of financial resources to pay for it.

The extreme differences in the landscape and development indicate that although the two study sites are within the same province, they share some similarities but they are largely heterogeneous which makes them ideal for this study. However, an objective assessment based on the similarities and disparities of the study sites will provide a clearer understanding of the contribution of wild foods to food security in the contexts of HIV/AIDS, climate change and variability.

1.8 Thesis structure

Chapter one has introduced the background to the study, the key questions and given a description of the study areas. Definitions of food security, climate change and variability have been briefly outlined. The consumption of wild foods by different rural communities has been introduced, with specific attention being placed on households made vulnerable by the HIV/AIDS pandemic and the research gaps which this study intends to fill have been clearly explained.

Chapter two examines the relative contribution of different food sources; purchased, grown, gathered from the wild and donated, to individual and household diets and assesses dietary quality and quantity. It also shows the impact of HIV/AIDS on individual and household diets. Peoples' perceptions and experiences of food security are probed and comparisons between and within households are made. The data used for this chapter were mainly taken from the detailed 48 hour individual dietary recall, actual food measurements, the individual food security questionnaire and individual mid-upper arm circumference measurements of respondents.

Chapter three explores the consumption and use of wild foods based on household affliction status and gender. It also analyzes the impacts of droughts and why some households are more affected than others. Species of wild foods consumed are identified together with the frequency of consumption and the reasons for consumption and use of wild foods. Coping strategies adopted by individuals and households to limit food insecurity when there are harsh climatic events such as droughts are also outlined and the perceptions of drought tolerance of wild and conventional vegetables is compared. Data for this chapter were mainly drawn from the individual wild foods and food security questionnaires and the climate change questionnaire that was administered to household heads.

Chapter four is a general discussion and synthesis of the results obtained from the research. It integrates the results from chapters two and three so as to provide a clear picture and understanding of the relative contribution of wild foods to individual and household food security in the context of HIV/AIDS, climate change and variability in the Eastern Cape, South Africa. Conclusions and recommendations for future research are clearly presented in the chapter.

CHAPTER 2

Contribution of different food sources to individual and household food security: people's perceptions and experiences



“We struggle to grow crops because we have no money to buy fencing material, tools, and seeds and at times we have no tap water. The little money we get is used to buy food for the household which is also not enough”.

Nonceba, 38 year old woman, Lesseyton

2.1 Introduction

Food security exists when all people at all times have sufficient food to live an active and healthy life (FAO 1996). Food security is affected by factors such as income sources, levels of development, health, household structure, access to land and water, retail markets, education and nutritional knowledge (HSRC 2007). The FAO (1996) definition is most widely used and it emphasises availability and access. However, some researchers argue that the FAO (1996) definition does not address the social and environmental aspects of food security. In light of this, Hamm and Bellows (2003) devised the concept of community food security which they defined as “a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice”. The above definition puts more emphasis on the sustainability of supply and looks at all aspects of the food system so that food security can be considered in a holistic manner (Swisher and Brennan 2007).

Food insecurity on the other hand, occurs when people have challenges in acquiring enough food for them to live an active and healthy life (FAO *et al.* 2012). The FAO *et al.* (2012) report on food insecurity states that almost 870 million people in developing countries are malnourished and of these, 260 million live in sub-Saharan Africa, including South Africa. Food security is multi-faceted, dynamic and fundamental for the survival of humanity, yet in South Africa there is no prescribed methodology for measuring and monitoring food security (HSRC 2007). In as much as some surveys have been done on certain aspects of food insecurity in South Africa, no in-depth research has been done to fully understand all the aspects of food insecurity (Labadarios *et al.* 2011).

Several methods have been used to determine levels of food security in South Africa. For example, the Global Food Security Index developed by the Economist Intelligence Unit (2012) based on a broad range of indicators, ranks South Africa as number 40 out of a subset 105 countries in the world and classifies it as food secure. However, national food security does not equate to household or individual food security and a significant number of households in the country are food insecure (Hart 2010, Altman *et al.* 2009). Charlton and Rose (2002) reported household food insecurity in 43 % of households in South Africa and also pointed out that more than 35 % of the population is estimated to be vulnerable to food insecurity. In their review of national surveys on food security in South Africa, Labadarios *et al.* (2011) found that firstly, food insecurity significantly decreased at both household and individual level from 1999 to 2008, yet the number of people vulnerable to food insecurity did not change. Secondly, the prevalence of food insecurity had significantly declined in all provinces, although the Eastern Cape remained with the highest prevalence of 45.4 %.

Several authors have looked at how health affects food security in South Africa, with particular emphasis on HIV/AIDS (Twine and Hunter 2011, McGarry and Shackleton 2009, Onyango *et al.* 2009, Kaschula 2008, Hunter *et al.* 2007) and they have drawn a number of similar conclusions from their studies. HIV/AIDS is one of the greatest challenges that South Africa and the rest of the world are battling today (Shackleton and Shackleton 2012, Kaschula 2011, Shackleton *et al.* 2010, Ladzani 2009, Ziervogel and Drimie 2008). HIV/AIDS affects the health of an individual and their ability to work and generate income and ultimately the well-being of their family (UNAIDS 2003). The pandemic has worsened food insecurity that was in the past caused by climatic and social factors because it affects the economically active household members who are more often the breadwinners (Ladzani 2009). Generally, where HIV prevalence is high, all aspects of food security – availability, stability, access and utilization, are significantly affected (Ladzani 2009, HSRC 2004). According to the UNDP (2003), more than 50 % of HIV/AIDS afflicted households in South Africa are food insecure. Food insecurity is caused by poor dietary quality, low nutrient intakes and insufficient consumption of dairy products, fruit and vegetables (Kirkpatrick and Tarasuk 2008). Since HIV/AIDS and food insecurity are positively correlated, households affected by HIV/AIDS tend to have insufficient food to feed the household due to the loss of productive labour (Kaschula 2008). They are also forced to consume less nutritious food just to satiate their hunger (Onyango *et al.* 2009).

Hunter *et al.* (2007) reached two fundamental conclusions from their study on adult mortality and household dietary use of local environmental resources in rural South Africa. Firstly, they found that mortality due to HIV/AIDS increased the household's vulnerability to food insecurity, although this was dependent on the gender and socio-economic status of the deceased. Secondly, the consumption of wild foods was used both as a short and long term coping strategy by HIV/AIDS afflicted households. These findings by Hunter *et al.* (2007), are reiterated by Kaschula (2008), who also found that HIV/AIDS afflicted households in South Africa were more food insecure and consumed more wild foods than non-afflicted households. However, McGarry and Shackleton (2009) in their study on rural children's use of wild resources to counteract food insecurity in the Eastern Cape, South Africa, found that HIV/AIDS afflicted households sometimes decreased consumption of wild foods due to stigma from the community and labour shortages for collection.

In South Africa, another major cause of food insecurity is unemployment and high levels of poverty (Labadarios *et al.* 2011, HSRC 2007). Other parts of the world have made significant efforts to reduce poverty, yet sub-Saharan Africa continues to be poverty stricken (HSRC 2007). Statistics show that 80 % of people who are food insecure in Africa reside in rural areas and the remaining 20 % in urban areas (HSRC 2007). The South African government has several policies that have been designed to mitigate food insecurity (Labadarios *et al.* 2011). South

Africa is the only country in southern Africa that provides state pensions and social grants to its people (Ladzani 2009). Social grants that come in the form of old age pensions, disability grants, foster care grants care dependency grants and child support grants have been indispensable in improving household food security, yet in several cases, the grants are insufficient to meet the daily food requirements of an average household due to the high cost of living (Aliber 2009, Altman *et al.* 2009). Sometimes, not all qualifying citizens have access to these social grants thus leaving households in absolute poverty and highly vulnerable to food insecurity because they have no form of income for food purchases (Labadarios *et al.* 2011). The inability of households to meet their daily dietary requirements exposes its members to malnutrition and creates numerous health problems (Ladzani 2009).

One other government strategy aimed at mitigating food insecurity is the National School Nutrition Programme (NSNP). The objectives of the NSNP are: (i) to improve the quality of education by increasing children's active learning capacity, (ii) to give children an incentive to attend school and (iii) to reduce short-term hunger and improve micronutrient intake (Kallman 2005). Although generally regarded as a successful programme, some schools in remote rural areas have not yet benefited due to problems of accessibility. Hence food insecurity and malnutrition levels amongst children are still very high (Kallman 2005). Wild foods contribute directly and indirectly to household food security in two ways: (i) wild foods are gathered for direct household consumption and (ii) wild foods are gathered and sold to generate income for the household to use for food purchases. Given the fact that malnutrition is widespread in Africa, supplementation of diets with wild foods by rural communities is important for ensuring good nutrition and food security (Barany *et al.* 2001).

Considering the current literature and findings, there is a need to address contemporary research regarding the relative contribution of wild foods to food security in the contexts of HIV/AIDS, climate change and variability. In an endeavour to fill this gap, there are a number of issues that need to be borne in mind. Firstly, the consumption of wild foods is sometimes opportunistic and seasonal and is often omitted as an indispensable means of ensuring food security (Bharucha and Pretty 2010). Secondly, rural households that consume wild foods often perceive purchased foods to be more valuable than wild foods. These households then put more emphasis on purchased foods and wild foods tend to be overlooked by researchers. Thirdly, the consumption of wild foods is affected by preferences hence it is sometimes done at individual level. Conventional food security assessments emphasise household food security and put emphasis on the household as the unit of analysis (FAO 2007, Swindle and Blinisky 2005). Household surveys focus on what is consumed by households and in the process omit the contribution of wild foods such as wild fruits, wild animals and wild birds which are sometimes collected and consumed in the forest (Kaschula 2008, Gewa *et al.* 2007).

Modi *et al.* (2006), aptly states that “despite the abundance of wild foods and their beneficial nutritional value, no published studies have been done to show that rural households, both afflicted and non-afflicted by HIV/AIDS in South Africa, make extensive use of these natural resources to improve health and food security”. It is therefore the essence of this chapter to determine the contribution of wild foods to individual and household diets relative to other food sources. It tests the hypothesis that “wild foods contribute significantly to individual and household food security in the context of HIV/AIDS”. The research questions addressed were:

1. What is the composition and quality of individual and household diets and how does it vary in relation to household HIV/AIDS affliction status?
2. What are the relative quantities of wild foods consumed by individuals and households?
3. What are peoples’ perceptions and experiences of food security?
4. How does HIV/AIDS affect people’s perception of their diets in terms of quality and quantity?

2.2 Approach

Quantitative and qualitative methods were used to investigate food acquisition and consumption patterns, with particular attention being paid to the relative contribution of wild food sources. The survey instrument had a 48 hour dietary recall and three separate questionnaires on wild foods, climate change and food security. All interviews were conducted in the local language, *isiXhosa*, by the researcher with the assistance of two field enumerators. Data were gathered at individual level within afflicted and non-afflicted households in Lesseyton and Willowvale (Figure 2.1). Data relating to the occurrence of droughts and coping strategies employed by households was collected from household heads only whilst the food security data were collected from individuals of school going age (6 years) and above in afflicted and non-afflicted households. Due to seasonal availability of wild and grown foods, data were collected quarterly over a period of one year to capture all wild foods consumed and used annually. The first data collection was done in August 2011, the second in November 2011, the third in February 2012 and the final in May 2012 (Figure 2.1).

2.3.0 Data Collection

2.3.1 Selection of households for the study

Households were purposely selected using the information captured and obtained from a baseline survey of a parallel study (Stadler 2012). In the baseline study, a total of 340 households were sampled, 170 households in Lesseyton and 170 households in Willowvale (See Appendix A for the survey questionnaire). Aerial photographs of the two sites were used to select households through stratified random sampling.

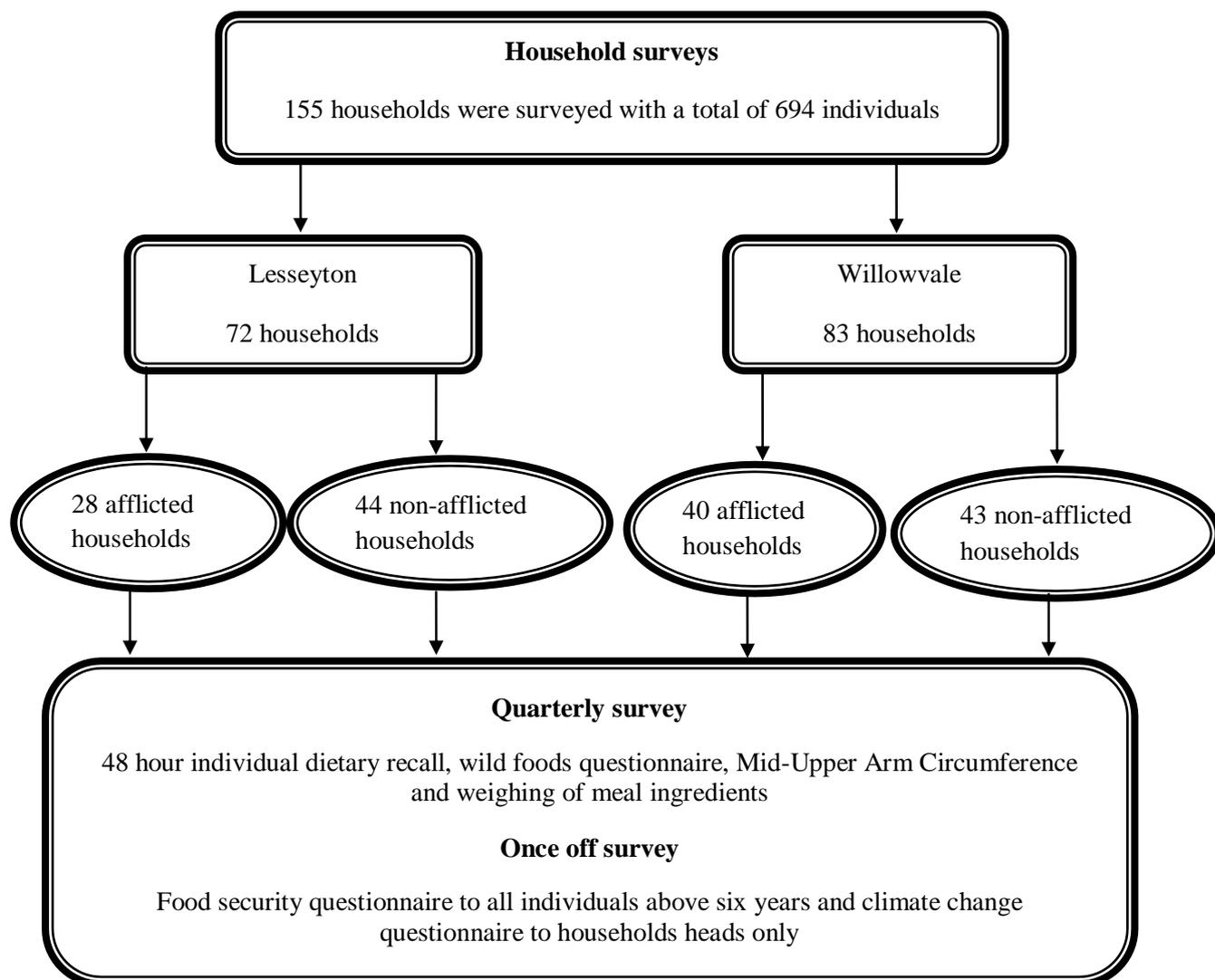


Figure 2.1: The data collection process

Numbered grids, equivalent to 100 m x 100 m for Willowvale, and 50 m x 50 m for Lesseyton, were placed over the imagery using Geographic Information Systems (GIS) software, and random numbers generated. Different size grids were used for both sites because of the different settlement patterns with Lesseyton having a grid settlement pattern and Willowvale having a dispersed settlement pattern. The north-most household in a generated grid block was interviewed. If no household fell within a selected grid block, the closest household was interviewed. If a household did not wish to take part in the survey, the nearest neighbouring household was approached for interviewing. From the 340 households of the baseline survey a subsample was identified for this food security study. Since the research used households identified from the baseline survey, a possibility of research fatigue was identified as this could affect the results obtained. To overcome this, households were compensated for their time with gifts of small groceries worth R50 which had been adopted as a suitable strategy in the broader project.

With regards to HIV/AIDS, all households were classified using HIV/AIDS proxy indicators to identify afflicted and non-afflicted households. The proxy indicators developed by the SADC FANR Vulnerability Assessment Committee (2003) provided a starting point. The proxy indicators are a more sensitive and ethical way to assess household vulnerability to HIV/AIDS even though they may not give the exact picture of the HIV/AIDS effect in a household (SADC FANR Vulnerability Assessment Committee 2003). These proxy indicators have been widely used by other authors (Twine and Hunter 2011, McGarry and Shackleton 2009, Kaschula 2008). The SADC FANR Vulnerability Assessment Committee (2003) proxy indicators for HIV/AIDS used were:

1. Presence in the household of chronic (over three months) illness of a person aged 0-59 years.
2. Presence in the household of chronic (over three months) illness of a person aged 0-59 years and receiving free treatment.
3. Recent (last two years) death in the household of someone between the age 0-59 years.
4. Recent death in the household of someone between the age 0-59 years who experienced at least three months of chronic illness before death.
5. The presence of children under 19 years with both parents deceased.

The third proxy indicator was modified to last five years from last two years because the number of afflicted households obtained initially was too low for the study. By increasing the number of years to five, HIV/AIDS is still accounted for because its wide effects have been evident for at least the past two decades. There are five HIV/AIDS proxy indicators, hence, households were grouped depending on the number of affirmative responses to the indicators. Those that responded negative to all the proxy indicators were classified as non-afflicted by HIV/AIDS and those with three or more positive responses were classified as afflicted by HIV/AIDS. Households that responded positively to one or two proxy indicators were classified as borderline and were excluded. The use of 'afflicted' in this context refers to a household not an individual, hence it does not mean that an individual person is infected with HIV/AIDS. Using these HIV/AIDS proxy indicators, a total of 155 households were investigated in both sites. Selected households were visited and informed consent of each household member was sought for them to participate in line with the Rhodes University ethical guidelines (see <http://www.ru.ac.za/research/research/ethics>). For minors, consent was provided by their parents or guardians. A total of 694 individuals were sampled from all 155 households (Table 2.1).

Table 2.1: Number of individuals interviewed in each site and HIV/AIDS category

Age group (years)	Lesseyton					Willowvale				
	Afflicted		Non-Afflicted		Total	Afflicted		Non-Afflicted		Total
	M	F	M	F		M	F	M	F	
2 – 3	6	5	6	8	25	7	5	4	7	23
4 – 8	12	19	8	12	51	12	15	16	9	52
9 – 13	7	8	18	10	43	6	12	12	20	50
14 – 18	12	12	10	18	52	13	7	15	7	42
19 – 30	16	20	15	18	69	7	14	11	15	47
31 – 50	4	11	16	18	49	5	12	5	16	38
51+	9	21	9	15	54	19	33	13	34	99
Total	66	96	82	99	343	69	98	76	108	351

2.3.2 Food sources

The contribution of different sources of food to individual and household diets in terms of intake and diversity was investigated using a 48 hour dietary recall which is a modification of the commonly used 24 hour recall method (Hirvonen *et al.* 2006, Swindle and Blinisky 2005). The 48 hour dietary recall method is a rapid, user friendly and cost-effective approach that can be used to investigate dietary quality at individual and household levels (Swindle and Blinisky 2005, Grünberg *et al.* 1997). The 48 hour dietary recall survey was administered quarterly to all individuals in the 155 sample households to gather information on: the number of eating occasions, type of dish, ingredients of each dish, approximate amounts and source of each ingredient which was classified as purchased, grown, gathered from the wild or donated (See Appendix B). Timing of the quarterly visits may influence the 48 hour dietary recall of respondents. For example, some households purchase meat after receiving grant payments or salaries and if a 48 hour dietary recall is done at that time, it might reflect greater meat consumption for the two day sampling period which may not be typical for the rest of the month. Therefore, dates for grant payouts were obtained and these days were avoided and sampling included weekends as well as weekdays.

Information was gathered for each member of a household to facilitate intra-household analysis and this was later combined to derive household information. The Individual Dietary Diversity Index (IDDI) and Household Dietary Diversity Index (HDDI) are qualitative measures of food consumption that assess individual and household dietary access to different food types and nutrient adequacy (FAO 2007, Swindle and Blinisky 2005). Using the IDDI and HDDI, an Individual Dietary Diversity Score (IDDS) was determined for each household member and Household Dietary Diversity Score (HDDS) was determined for each household. IDDS and HDDS capture the variety of foods consumed by an individual or household over 48 hours and a score is calculated by adding up the number of foods groups consumed out of the eleven groups (Table 2.2). A well balanced diet scores between eight and eleven (Swindle and Ohri-

Vachaspati 2005, FAO and WHO 2002). A dietary score between one and three was classified as unbalanced and a score between four and seven was classified as moderately balanced.

Table 2.2: The eleven food groups for classification of IDDS and HDDS

Cereals	Pulses and legumes	Sugar and honey
Milk and milk products	Eggs	Fruits
Meat and offal	Fish and sea food	Vegetables
Roots and tubers	Oils and fats	

To triangulate the 48 hour dietary recall results, actual observations on food preparation were done quarterly for all the survey households in both study sites. Two meals were sampled per household per quarter, providing a total of 1 240 meals. Dry weights of the ingredients per meal were weighed using a digital scale and measuring cylinder (volume) to get the actual amounts of food consumed by the household. Appointments were made with the person responsible for preparing either lunch or supper so that the researcher could make observations and weigh the ingredients used to prepare a meal. Snack items that were consumed by individuals within and out of the household were also recorded. This was done to avoid the omission of items such as wild fruits, wild meat and wild vegetables. Usually individuals from the same household ate a relatively similar diet and there were negligible dietary differences between household members. The only food variations were observed for foods in the same food group such as a choice of cereal; where a person ate rice instead of sump, or wild green leafy vegetables instead of spinach. For the purposes of this research, a meal was defined as any regular occasion when any form of food is served and eaten together by most members of the household. A household was defined as “one person who lives alone or a group of persons, related or unrelated, who live together and share food or make common provisions for food and possibly other essentials for living” (Cogill 2001).

2.3.3. Anthropometric measures

The Mid-Upper Arm Circumference (MUAC) was used to assess the longer-term nutritional status of all individuals in the study. This rapid method has been widely used to estimate the prevalence of malnutrition of individuals in a population (Cogill 2001). MUAC was measured in millimetres using a non-stretch tape measure with the left arm hanging relaxed. The measurement was taken mid-way between the tip of the acromion (bony protrusion of the shoulder) and the olecranon process (point of the elbow). The tape measure was placed firmly round the arm without compression of soft tissue.

2.3.4 Food Security

A questionnaire on food security was administered once, during the third quarter, to individuals from afflicted and non-afflicted households at each site. For children, only those of school going age (six years and above) were interviewed. It contained questions probing experiences of hunger or food insufficiencies, perceived causes thereof and the coping strategies typically employed during periods of hunger. The questionnaire also asked respondents if they experienced periods of food surplus, and when these usually occurred (See Appendix C).

2.3.5 Data analysis

Quantitative data were used to statistically analyse the contribution of wild foods to food security and the impacts of HIV/AIDS and climate change on individual and household food security. Data analysis focused on food security in terms of quantities, diversity and source in relation to HIV/AIDS status of the household. These were also disaggregated for different ages and genders within the household and compared with the minimum daily energy requirements stipulated by the Institute of Medicine (2007). Data were analysed using Statistica 10. Chi-square tests were used to test for significances between afflicted and non-afflicted households and between the two study sites for all the categorical variables. T-tests were used to test for significances between the means of data for afflicted and non-afflicted households as well as between the two study sites. MUAC measurements obtained for each individual were compared with benchmarks provided by WHO and UNICEF (2009) for infants and children, and Ferro-Luzzi and James (1996) for adults based on the age and gender of the individual.

2.4 Results

2.4.1 Household size

In Lesseyton, afflicted households were significantly larger although in Willowvale there were no significant differences (Table 2.3). Comparison between the sites regardless of affliction status also showed no significant differences ($t=1.069$, $df=154$, $p=0.287$) (Table 2.3).

Table 2.3: Mean (\pm SE) household sizes

Site	Lesseyton	Willowvale
Afflicted	5.79 \pm 3.48	4.23 \pm 2.55
Non-Afflicted	4.11 \pm 2.78	4.32 \pm 2.54
t-test	($t=2.268$, $df=71$, $p=0.026$)	($t=-0.180$, $df=82$, $p=0.858$)
Combined	4.76 \pm 3.14	4.28 \pm 2.53

2.4.2 Composition of individual and household diets

In Willowvale, households typically cooked twice a day. Food quantities used to prepare breakfast, lunch or supper were doubled so that they could have the remainder for the next meal.

For example, if the household baked bread for breakfast, the quantities of ingredients used were doubled so that bread was available for lunch, then supper would be a different meal. In essence, of the three meals consumed per day, two were mostly similar.

In Lesseyton, households cooked three times a day and lunch was generally different from supper. In both sites breakfasts were either tea with sugar, bread occasionally with margarine, or maize meal porridge with sugar.

In Lesseyton, households sometimes purchased bread although they typically baked bread at home, whereas in Willowvale, there were no bread purchases. In Lesseyton, tea was occasionally served with a creamer, whereas in Willowvale, tea was served black. There was a variation of meals served for lunch and supper, usually one of (1) samp and beans, (2) *umphokoqo* (crumbed pap) and *amasi* (sour milk), (3) stiff pap and cabbage or spinach (4) rice, tomato and onion soup and potatoes. These meals were sometimes served with meat, typically one of chicken, mutton, tinned pilchards or offal. In terms of total caloric intake, cereals made the highest contribution to individual and household diets in both Lesseyton and Willowvale (Figure 2.2).

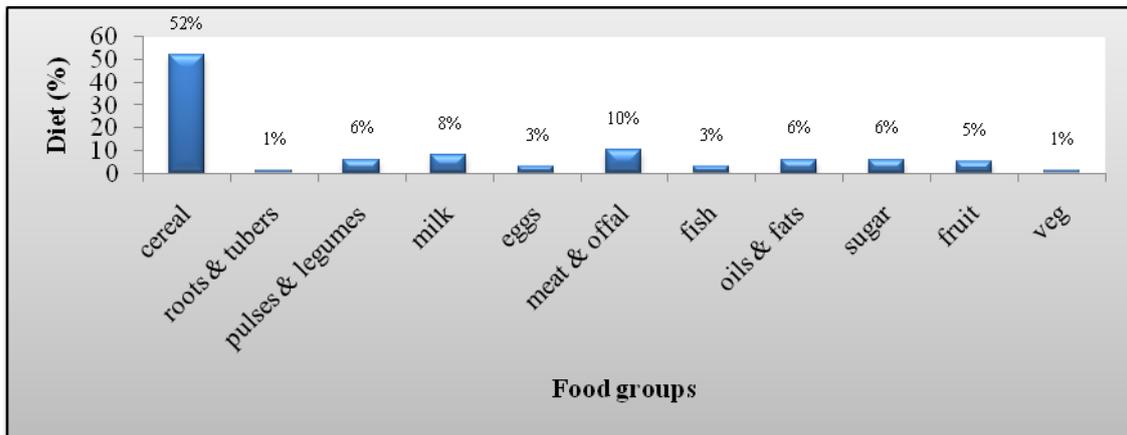


Figure 2.2: Contribution of various food groups to diets

Diets were similar and with limited variety in the two study sites (Table 2.4). The bulk of food consumed by households was purchased and the only foods collected from the wild were fruits and vegetables.

Table 2.4: Food items consumed in each food group

Food group	Food item	Source
Cereal	Rice, maize, bread	Purchased
Legumes and pulses	Beans, cowpeas	Purchased, own production
Roots and tubers	Irish potatoes, onions, carrots	Purchased, own production
Dairy	Fresh milk, sour milk	Purchased, own production
Seafood	Tinned pilchards	Purchased
Oils and fats	Margarine, sunflower oil	Purchased
Sugars	Sugar	Purchased
Fruits	Peaches, guavas, prickly pears, apples, bananas, tomatoes	Purchased, own production, gathered from the wild
Vegetables	Spinach, cabbage, wild vegetables	Purchased, own production, gathered from the wild
Meat	Offal, mutton, chicken, polony	Purchased
Eggs	Eggs	Purchased

2.4.3 Quality of diets

More than 80 % of respondents and households from the two study sites had moderately balanced diets with an IDDS and HDDS between 4 and 7 (Table 2.5).

Table 2.5: Proportion of individuals and households in three dietary diversity categories from four 48 hr dietary surveys

	Score	Lesseyton				Willowvale			
		Afflicted (%)		Non-Afflicted (%)		Afflicted (%)		Non-Afflicted (%)	
Diet		IDDS n=162	HDDS n=28	IDDS n=181	HDDS n=44	IDDS n=167	HDDS n=40	IDDS n=184	HDDS n=43
Unbalanced	2	3	7	2	2	2	6	2	2
	3	6	9	6	4	10	11	8	3
Moderately balanced	4	22	25	20	20	34	37	30	27
	5	32	33	35	37	41	36	35	40
	6	25	19	24	24	11	8	18	21
Well balanced	7	10	6	10	9	1	1	5	5
	8	2	1	3	4	1	1	2	2
Total		100	100	100	100	100	100	100	100

There were no significant differences in IDDS between respondents from afflicted and non-afflicted households in Lesseyton ($\chi^2=1.332$; df=6; p=0.969) or Willowvale ($\chi^2=8.484$; df=6; p=0.205). However, there was a higher proportion of non-afflicted households than afflicted ones with HDDS between 4 and 8 in Lesseyton ($\chi^2=24.724$; df=6; p<0.001) and Willowvale ($\chi^2=45.185$; df=6; p<0.001). Generally, there were no significant IDDS ($\chi^2=2.521$; df=2; p=0.283) and HDDS ($\chi^2=1.356$; df=2; p=0.508) differences between the two sites.

2.4.4 Vegetable consumption

Leafy vegetables consumed by individuals and households were purchased, grown in gardens and gathered from the wild (Table 2.6). Afflicted households in Lesseyton did not produce any vegetables ($\chi^2=15.458$; $df=2$; $p<0.001$) whilst in Willowvale, the bulk of vegetables consumed by afflicted households were collected from the wild ($\chi^2=12.816$; $df=2$; $p=0.002$). Vegetables grown in the garden had the lowest contribution to overall vegetable consumption in both Lesseyton and Willowvale.

Table 2.6: Proportion of vegetables procured from different sources

Source	Lesseyton		Willowvale	
	Afflicted (%)	Non-Afflicted (%)	Afflicted (%)	Non-Afflicted (%)
Purchased	94	83	39	40
Production	-	13	15	28
Wild gathered	6	4	46	32
Total	100	100	100	100

Differences in vegetable consumption between afflicted and non-afflicted households in Lesseyton were in the late dry and late wet season (Figure 2.3). Respondents from afflicted households consumed approximately 120 g of vegetables ($t=3.122$; $df=107$; $p=0.002$) during the late dry season whilst those from non-afflicted households consumed 80 g. In the late wet season, respondents from afflicted households consumed 30 g whilst those from non-afflicted households consumed 60 g ($t=7.915$; $df=429$; $p<0.001$).

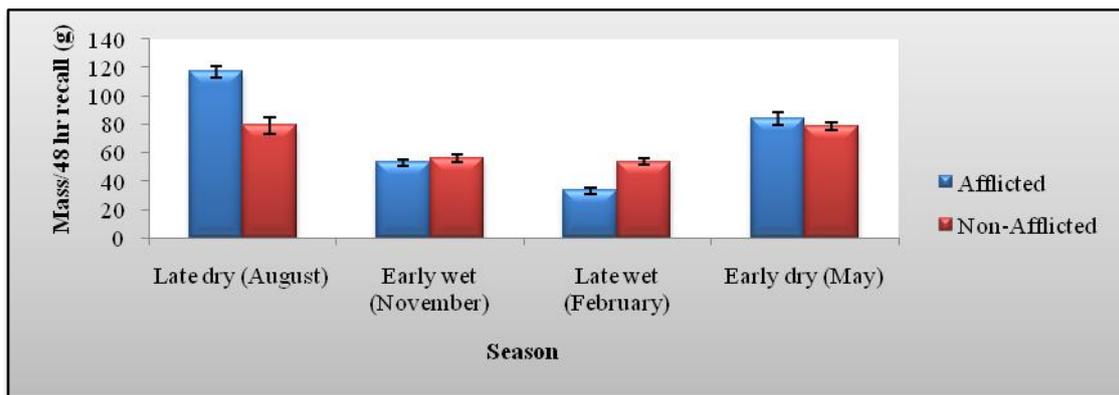


Figure 2.3: Mean (±SE) vegetable consumption per 48 hours in Lesseyton per respondent

Vegetable consumption was 60 g for respondents from both afflicted and non-afflicted households during the early wet ($t=0.931$; $df=386$; $p=0.353$) and 80 g during the early dry seasons ($t=1.257$; $df=177$; $p=0.210$). Generally, respondents consumed more vegetables during the late dry season (80 – 100 g) and the lowest in the late wet season (40 – 60 g) regardless of household affliction status ($p<0.001$).

In Willowvale (Figure 2.4), individuals from non-afflicted households ate 100 g of vegetables which was significantly higher than 80 g for respondents from afflicted households ($t=3.591$; $df=325$; $p<0.001$) during the late dry season. Respondents from afflicted households consumed more vegetables (80 – 120 g) in the early wet, late wet and early dry seasons ($p<0.001$). The highest vegetable consumption was approximately 80 – 120 g in the early dry season and the lowest was 60 – 80 g in the early wet and late wet seasons ($p<0.001$) regardless of household affliction status. Generally, vegetable consumption was lower in Lesseyton, averaging 60 – 70 g compared to 80 – 90 g in Willowvale ($t=14.141$; $df=2086$; $p<0.001$).

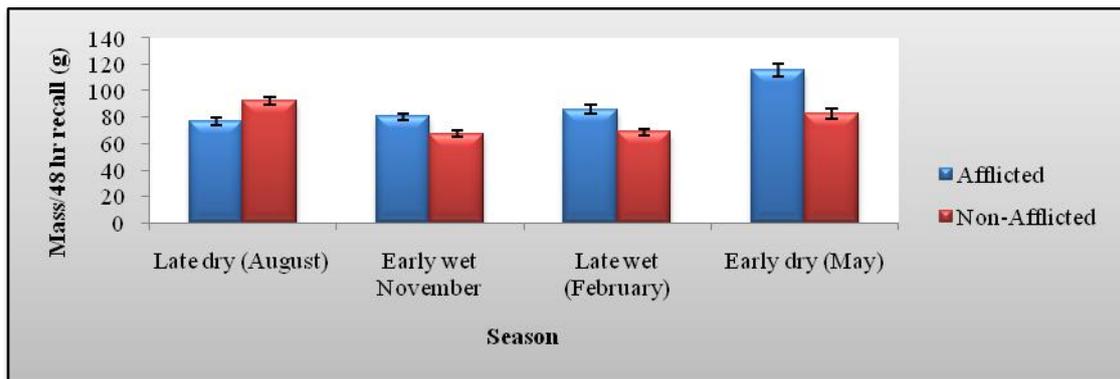


Figure 2.4: Mean (\pm SE) vegetable consumption per 48 hours in Willowvale per respondent

Wild leafy vegetables were consumed all year round in 75 % of afflicted households and 53 % of non-afflicted households in Willowvale ($\chi^2=19.430$; $df=1$; $p<0.001$). In Lesseyton, wild leafy vegetables were consumed in 14 % of afflicted households and 7 % of non-afflicted households during the late wet season only ($\chi^2=7.527$; $df=1$; $p=0.006$). The only wild vegetable consumed by households in Lesseyton was *Amaranthus lividus* (pigweed) known as *utyuthu* in isiXhosa. There was a greater proportion of households in Willowvale that ate wild leafy vegetables by comparison to Lesseyton ($\chi^2=89.238$; $df=1$; $p<0.001$).

2.4.5 Fruits

Households in the two study sites consumed fruits though there were significant variations in the types of fruit consumed, period of consumption and sources. Fruit consumption in Lesseyton occurred in all four seasons (Figure 2.5).

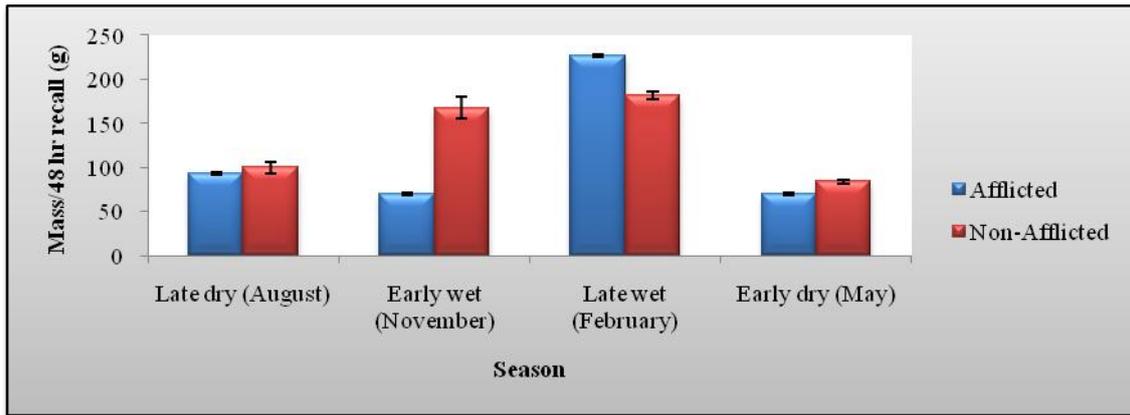


Figure 2.5: Mean (\pm SE) fruit consumption per 48 hours in Lesseyton per respondent

Individuals from non-afflicted households consumed 150 g of fruit in the early wet season which was more than 60 g consumed by respondents from afflicted households ($t=2.60$; $df=7$; $p=0.035$). Similarly in the early dry season respondents from non-afflicted households ate approximately 90 g of fruit which was more than 60 g consumed by respondents from afflicted households ($t=3.626$; $df=21$; $p=0.002$). In the late wet season, individuals from afflicted households consumed approximately 250 g of fruit whilst those from non-afflicted households ate 200 g hence there was a significant difference ($t=5.934$; $df=324$; $p<0.001$). Fruit consumption was approximately 100g for respondents from both afflicted and non-afflicted households in the late dry season ($t=0.351$; $df=19$; $p=0.730$). The highest fruit consumption was in the wet season and the lowest was in the early dry season ($p<0.001$).

In Willowvale, fruit consumption was in the late wet and early dry season only (Figure 2.6). Respondents from afflicted households had higher fruit consumption of approximately 300 g during the late wet season whereas those from non-afflicted households ate 180 g ($t=7.738$; $df=232$; $p<0.001$). During the early dry season, respondents from afflicted households ate 200 g of fruit whilst those from non-afflicted households ate approximately 250 g yet there was no significant differences ($t=1.90$; $df=236$; $p=0.059$). Comparisons of fruit consumption regardless of household affliction status showed that the highest fruit consumption was in the early dry season ($t=2.350$; $df=470$; $p=0.019$). A pooled analysis between the two sites regardless of household affliction status and season, showed that Willowvale respondents consumed approximately 230 g of fruit which was more than 130 g consumed by respondents in Lesseyton, despite the fact that household members did not consume any fruit during the late dry and early wet seasons ($t=17.624$; $df=849$; $p<0.001$).

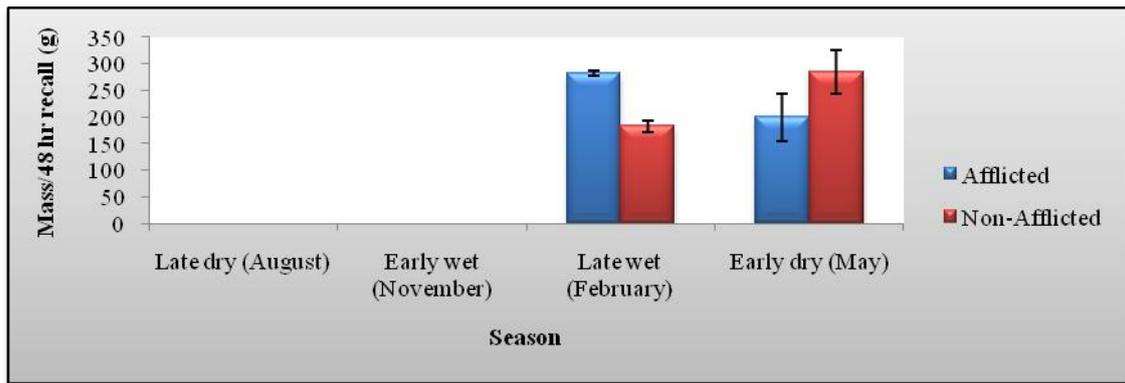


Figure 2.6: Mean (\pm SE) fruit consumption per 48 hours per respondent in Willowvale

In Lesseyton, wild and home grown fruits were consumed during the late wet season whilst purchased fruit were consumed throughout the study period. Prickly pear collected from the wild, peaches grown in backyard gardens and purchased bananas, oranges and apples were consumed by households. Prickly pear was consumed by 54 % of afflicted households and 45 % of non-afflicted households ($\chi^2=3.273$; $df=1$; $p=0.070$). Prickly pear contributed 63 %, purchased fruit 2 % and peaches 35 % to overall fruit consumption for individuals from afflicted households whereas for individuals from non-afflicted households, prickly pear contributed 41 %, purchased fruit 22 % and peaches 35 % to overall fruit consumption ($\chi^2=29.987$; $df=2$; $p<0.001$). In Willowvale, on the contrary, there were no fruit purchases and no wild fruit consumption recorded during the dietary recalls. Fruit consumption was observed in 70 % of afflicted households and 89 % of non-afflicted households during the fourth quarter ($\chi^2=36.874$; $df=1$; $p<0.001$). Fruits consumed were entirely guavas grown in gardens in the homestead thus contributing 100 % to overall fruit consumption.

2.4.6 Food consumption patterns

More than 60 % of respondents in the two study sites ate three meals a day (Table 2.7). In Lesseyton there were no significant differences between afflicted and non-afflicted respondents ($\chi^2=3.703$; $df=7$; $p=0.813$) although in Willowvale, 11 % of respondents from non-afflicted households and 3 % from afflicted households ate four meals per day hence the significant difference ($\chi^2=6.649$; $df=2$; $p=0.036$).

Table 2.7: Proportion of respondents and number of meals consumed per day

Meals per day	Lesseyton		Willowvale	
	Afflicted (%) n=162	Non-Afflicted (%) n=181	Afflicted (%) n=167	Non-Afflicted (%) n=184
1	2	1	-	-
2	24	26	22	19
3	67	61	75	70
4	7	12	3	11
Total	100	100	100	100

Respondents who ate only one meal a day stated that they had insufficient money to buy food therefore they could only afford only one meal a day. If they increased the number of meals per day, their food stocks would run out before they get money to replenish them. Respondents that ate four meals a day in both sites were all school going children that received an extra meal at school and also ate three meals at home.

In Lesseyton, the majority of the respondents from afflicted and non-afflicted households that ate two meals a day were employed hence they preferred to have breakfast before going to work and supper when they return from work, whereas in Willowvale the respondents were all unemployed and spent most of their time at home. Respondents in Willowvale stated that they had insufficient money to buy food and no means to produce their own food therefore they could only afford to eat two meals a day.

In Lesseyton, 82 % of respondents from afflicted households and 84 % of respondents from non-afflicted households said that the number of meals they usually had was the same throughout the year ($\chi^2=0.064$; $df=1$; $p=0.799$). In Willowvale, 98 % of respondents from afflicted households and 94 % from non-afflicted households said the same ($\chi^2=0.278$; $df=1$; $p=0.698$). Some of the respondents at both sites said that the number of meals they had varied throughout the year depending on availability of income to buy food. School going children at both sites also said that during the school term they had an additional meal at school (Table 2.8), but once schools were closed for holidays, they ate either two or three meals a day.

Table 2.8: Meals provided at schools

Site	Monday	Tuesday	Wednesday	Thursday	Friday
Lesseyton	Pap Milk Fruit	Rice Tomato and onion soup Fruit	Rice Soup Pilchards Butternut	Pap Soup Butternut	Pap Milk Fruit
Willowvale	Rice Cabbage Carrots Potatoes Pilchard Soup	Rice Soup Chicken Potatoes Fruit	Samp Beans Potatoes Fruit	Rice Cabbage Carrots Potatoes Pilchard Soup	Rice Soup Chicken Potatoes Fruit

Respondents were also asked if they had snacks between meals and the options given were “always, usually, sometimes, rarely or never” (Table 2.9). In Lesseyton, 45 % of individuals from afflicted households and 52 % of individuals from non-afflicted households said they “sometimes” had snacks between meals ($\chi^2=2.386$; $df=4$; $p=0.665$). Similarly, in Willowvale, 64 % of individuals from affected households and 61 % of individuals from non-afflicted households ($\chi^2=1.658$; $df=4$; $p=0.798$). Respondents said that they usually buy snacks after they

receive their social grant pay outs, remittances and salaries for those that are employed, which is once a month hence they do not eat snacks very often.

Table 2.9: Frequency of snack consumption

Frequency	Lesseyton		Willowvale	
	Afflicted (%) (n=141)	Non-Afflicted (%) (n=157)	Afflicted (%) (n=140)	Non-Afflicted (%) (n=158)
Sometimes	45	52	64	61
Always	36	27	16	19
Usually	12	12	10	14
Rarely	6	9	7	5
Never	1	1	2	1
Total	100	100	100	100

The majority of households in Lesseyton grew peaches in their gardens and those in Willowvale grew guavas which they snacked on when ripe. Households that grew peaches, guavas and maize sometimes shared their produce with those that did not produce any.

2.4.7 Food quantities

Comparisons with recommended minimum daily energy requirements provided by the Institute of Medicine (2007) for each age group (Table 2.10) revealed that male respondents in the 14-18 years and 19-30 years from afflicted households in both Willowvale and Lesseyton had average daily kilocalorie intakes that were more than 10 % lower than the recommended minimum daily requirements. Another similar observation made in the two study sites was that, in 46 % of age groups from afflicted households had lower average daily kilocalories than those from non-afflicted households ($p < 0.05$). Generally, Lesseyton individuals consumed more average daily kilocalories than Willowvale respondents in 62 % of the age-groups.

Table 2.10: Mean (\pm SE) kilocalories of food consumed by individuals from Willowvale and Lesseyton

Age/Gender M=Male, F=Female	Recommended Daily Kcal	Lesseyton			Willowvale			Between sites p-value
		Afflicted Mean Kcal	Non-Afflicted Mean Kcal	p-value	Afflicted Mean Kcal	Non-Afflicted Mean Kcal	p-value	
2-3yrs M,F	1000	1189.9 \pm 26.7	1197.9 \pm 41.2	0.211	1165.2 \pm 27.1	1306.9 \pm 29.7	0.037	0.003
4-8yrs M	1400	1603.4 \pm 25.9	1632.4 \pm 34.1	0.724	1467.9 \pm 29.9	1476.9 \pm 22.1	0.886	0.021
4-8yrs F	1200	1442.1 \pm 35.4	1529.7 \pm 23.5	0.038	1441.5 \pm 30.6	1484.0 \pm 34.7	0.729	0.472
9-13yrs M	1800	1723.1 \pm 45.3	1968.6 \pm 31.1	0.015	1852.4 \pm 70.6	1857.5 \pm 38.5	0.851	0.292
9-13yrs F	1600	1748.1 \pm 31.4	1797.5 \pm 34.8	0.530	1692.2 \pm 36.2	1688.4 \pm 23.3	0.682	0.009
14-18yrs M	2200	1954.6 \pm 66.1	2295.2 \pm 71.5	<0.001	1727.1 \pm 59.1	2160.3 \pm 67.0	<0.001	0.843
14-18yrs F	1800	1722.8 \pm 43.6	2020.4 \pm 37.9	<0.001	1745.4 \pm 80.4	1920.4 \pm 59.8	<0.001	<0.001
19-30yrs M	2400	1921.2 \pm 52.4	2289.5 \pm 45.0	<0.001	2153.7 \pm 80.5	2315.0 \pm 50.0	<0.001	0.023
19-30yrs F	2000	2114.1 \pm 33.5	2126.0 \pm 30.8	0.519	2073.6 \pm 39.9	2017.2 \pm 33.5	0.334	0.092
31-50yrs M	2200	2188.3 \pm 76.4	2352.1 \pm 39.8	0.034	2179.0 \pm 74.3	2210.6 \pm 62.3	0.853	0.023
31-50yrs F	1800	2036.5 \pm 33.4	2051.3 \pm 27.9	0.557	1884.3 \pm 39.0	1869.9 \pm 30.4	0.659	<0.001
51+ yrs M	2000	2060.0 \pm 38.3	2117.8 \pm 40.9	0.548	1960.7 \pm 32.6	2070.1 \pm 37.0	0.048	0.340
51+ yrs F	1600	1989.7 \pm 24.2	1968.1 \pm 29.9	0.488	1685.8 \pm 19.4	1760.1 \pm 20.1	0.044	<0.001
Overall		1828.8 \pm 13.1	1960.6 \pm 13.1	<0.001	1753.7 \pm 11.3	1800.7 \pm 10.3	0.002	<0.001

* Figures in bold in mean (\pm SE) kilocalories columns are more than 10 % lower than recommended minimum daily kilocalories

* Figures in bold in p-value columns are significant differences

2.4.8 Mid-Upper Arm Circumference

All respondents were sufficiently nourished (Table 2.11) despite the fact that majority had moderately balanced diets, and there were significant differences between respondents from afflicted and non-afflicted households in the 6-10 years age group in Lesseyton and 11-20 years age group in Willowvale. A few respondents had daily kilocalorie intakes below the recommended levels.

Table 2.11: Mean (\pm SE) Mid-Upper Arm Circumference for study respondents

Age (years)	Recommended MUAC (mm)	Lesseyton		p-value	Willowvale		p-value
		Afflicted (mm)	Non-Afflicted (mm)		Afflicted (mm)	Non-Afflicted (mm)	
2-5	>135	157 \pm 0.2	162 \pm 0.24	0.156	155 \pm 0.17	156 \pm 0.19	0.572
6-10	>140	170 \pm 0.2	192 \pm 0.57	<0.001	173 \pm 0.24	167 \pm 0.16	0.097
11-20	>170	234 \pm 0.2	236 \pm 0.29	0.786	235 \pm 0.44	223 \pm 0.26	0.013
21+	>210	302 \pm 0.4	299 \pm 0.35	0.539	269 \pm 0.27	264 \pm 0.29	0.133

2.4.9 Perceptions and experiences of food security

In Lesseyton (Figure 2.7), 36 % of respondents from afflicted households and 68 % from non-afflicted households felt they had sufficient food at home ($\chi^2=44.444$; df=1; p<0.001). Similarly, in Willowvale (Figure 2.7), 37 % of respondents from afflicted households and 79 % from non-afflicted households felt they had sufficient food at home ($\chi^2=75.676$; df=1; p<0.001). Unemployment, reliance on child support grants only, large household size and no form of income at all, were the reasons given by individuals that felt they had insufficient food at home from affected and not affected households in both sites.

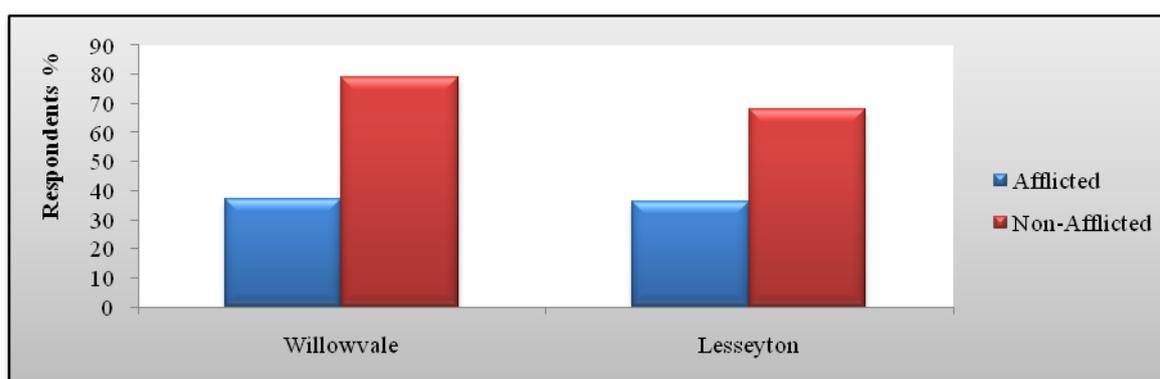


Figure 2.7: Proportion of respondents with adequate food at home

Respondents in both sites that felt they had insufficient food at home were asked “When last do you remember not having enough to eat at home” and the options “today or yesterday, a few days ago, more than two weeks ago, more than one month ago, a few months ago and a year ago” were given (Table 2.12).

Table 2.12: When last do you remember not having enough to eat at home?

Last period of food insufficiency	Lesseyton		Willowvale	
	Afflicted (%) (n=141)	Non-Afflicted (%) (n=158)	Afflicted (%) (n=140)	Non-Afflicted (%) (n=157)
Today/Yesterday	4	1	4	3
A few days ago	7	2	30	11
More than 2 weeks ago	15	13	18	5
More than a month ago	5	7	2	0
A few months ago	21	5	1	1
A year ago	13	5	9	2
Never	35	67	37	78
Total	100	100	100	100

More than 67 % of respondents from non-afflicted households and approximately 40 % from afflicted households in Lesseyton ($\chi^2=28.495$; $df=6$; $p<0.001$) and Willowvale ($\chi^2=37.363$; $df=6$; $p<0.001$) said they always have sufficient food at home. However, there was a higher proportion of respondents from Willowvale who had insufficient food at home a few days ago regardless of household affliction status ($\chi^2=10.63$; $df=6$; $p=0.023$).

The questions “Are there times during the month when you typically eat more, less and different types of food than usual” were asked (Table 2.13).

Table 2.13: Food availability during the month

Question	Lesseyton				Willowvale			
	Afflicted (%) n=141	Non-Afflicted (%) n=158	Chi-square	p-value	Afflicted (%) n=140	Non-Afflicted (%) n=157	Chi-square	p-value
More food than usual	91	89	0.409	0.523	85	71	9.519	0.002
Different types of food than usual	79	66	7.531	0.006	72	73	0.051	0.822
Less food than usual	75	56	14.651	<0.001	72	71	0.049	0.825

An overall comparison irrespective of affliction status showed that there were more respondents from Lesseyton who had times during the month when they typically ate more food than usual

($\chi^2=16.783$; $df=1$; $p<0.001$). Proportions of respondents who had times during the month when they typically ate less food and different types of food than usual were not significantly different between the two sites ($\chi^2=3.533$; $df=1$; $p=0.060$) and ($\chi^2=0.000$; $df=1$; $p=1.000$) respectively.

2.4.10 Coping strategies employed by households

Respondents in Lesseyton and Willowvale that felt they had insufficient food at home were asked “when you do not have enough to eat at home, what do you normally do?” and the options provided were “go all day without eating, collect wild foods, skip meals, serve smaller portions, eat food you do not like, borrow food or go to relatives and friends”. The most common coping strategy in both sites was borrowing food or going to relatives or friends and the least common was going all day without eating (Table 2.14). Of particular interest is that in Lesseyton, collection of wild foods was the fifth most common coping strategy for individuals from both afflicted and non-afflicted households whilst in Willowvale there was a disparity in response. Collection of wild foods was the third most common coping strategy used by individuals from afflicted households whilst for individuals from non-afflicted households it was the second most common coping strategy. There were significant differences between respondents from afflicted and non-afflicted households in both Lesseyton ($\chi^2=16.018$; $df=5$; $p=0.007$) and Willowvale ($\chi^2=23.203$; $df=5$; $p<0.001$).

Table 2.14: Coping strategies employed by respondents to access food

Strategy	Lesseyton		Willowvale	
	Afflicted (%) (n=141)	Non-Afflicted (%) (n=158)	Afflicted (%) (n=140)	Non-Afflicted (%) (n=157)
Borrow food or go to relatives	93	87	91	100
Skip meals	75	79	37	35
Eat food you do not like	69	49	51	71
Serve smaller portions	66	74	49	65
Collect wild foods	60	47	50	81
Go all day without eating	14	9	15	19

2.5.0 Discussion

Findings from this chapter have shown that:

1. Diets for both afflicted and non-afflicted households are moderately well-balanced,
2. Households consume wild leafy vegetables though there are variations between and within the two study sites,
3. Anthropometric and food quantity measures show that respondents from both afflicted and non-afflicted households are sufficiently nourished yet the majority of afflicted households feel they have inadequate food at home and
4. Households use a variety of strategies to limit food insecurity, though borrowing food was the commonest.

These results are discussed further in greater detail below.

2.5.1 Dietary composition and quality

Sub-Saharan Africa is characterised by a large proportion of poor households with high levels of malnutrition (Uusiku *et al.* 2010, Faber *et al.* 2010, FAO 2008a). These poor households depend on diets that are cereal-dominant and nutrient deficient with very few animal products, fruits and vegetables (Faber *et al.* 2010, Oniang'o *et al.* 2003). In this study, cereal had the highest energy contribution (52 %) to individual and household diets in both Willowvale and Lesseyton which is similar to findings by McGarry and Shackleton (2009) and Kaschula (2008), who in their studies found diets of afflicted and non-afflicted households in rural parts of the Eastern Cape and KwaZulu Natal provinces to be cereal predominant.

Using HDDS, the proportion of non-afflicted households with moderately and well balanced diets was higher than that of afflicted households at both sites even though IDDS showed no significant differences. This difference could be pointed to the ability of non-afflicted households to spend more money on food items such as eggs and meat and the consumption of an additional food item increases the IDDS and HDDS thus improving the dietary quality. On the other hand, the differences in the results obtained from HDDS and IDDS could be a weakness in the methodologies. At the household level, results from HDDS may lead one to conclude that non-afflicted households are more food secure than afflicted households which may not necessarily be the case. At individual level, IDDS results may show that respondents from both afflicted and non-afflicted households are either food secure or food insecure because it disintegrates food consumption patterns from household level and narrows down to the particular individuals who have different dietary needs and preferences thus giving a more detailed result than the HDDS.

Households and individuals in Lesseyton showed a higher dietary diversity than those in Willowvale, even though diets in both sites were moderately balanced. A myriad of reasons can be given for this difference. Firstly, hunger and poverty are strongly linked therefore food insecurity greatly affects the poor in rural areas (FAO 2008a). This is mostly because rural communities cannot afford purchased food from nearby towns due to long distances to markets, high and unaffordable transport costs and high levels of poverty (McGarry and Shackleton 2009). Secondly, the absence of electricity in Willowvale makes it impossible for households to purchase perishables such as meat which would increase their dietary diversity. Thirdly, villages in Willowvale are serviced by a gravel road that is graded regularly but degrades easily because of the rain and the volume of traffic that uses it. The cost of transport for a return trip to town is R60 (R30 x 2) per person and extra fees are charged on every piece of luggage that is transported and this increases the cost of a trip. In Lesseyton a return trip to town costs R20 (R10 x 2) and luggage is not charged.

Transport costs are higher on gravel roads for the same distance on tarred roads due to the high vehicle maintenance costs created by poor road conditions (Andrew and Fox 2004). The high transport costs affect food security because they limit the luggage one can carry and a significant portion of household income is spent on transport. The fourth reason is that the cost of certain food items was different between the two sites and this affects what households consume. For example, a cabbage head costs R5 in Lesseyton and R10 in Willowvale as at 10 May 2012. This means that for the same amount of money, a household in Lesseyton can buy two cabbages or one cabbage plus other food items and increase their dietary diversity whereas a household in Willowvale cannot do the same because it would mean spending more on their already limited income.

2.5.2 Consumption of wild foods

In South Africa, the consumption of wild leafy vegetables is affected by a plethora of factors such as poverty, urbanisation, geographical location, proximity to markets and time of the year (Uusiku *et al.* 2010, Jansen van Rensburg *et al.* 2007, Jansen van Rensburg *et al.* 2004). In this study, more than 50 % of afflicted and non-afflicted households in Willowvale and less than 20 % of afflicted and non-afflicted households in Lesseyton consumed wild leafy vegetables during the reference period. The large difference in the number of households that ate wild leafy vegetables could be due to a number of reasons which include the different climatic conditions of the two study sites, site-specific factors and proximity to markets. The average rainfall for Willowvale, which is the coastal site, is 1 100 mm per annum whereas in Lesseyton which is the inland site it is less than 400 mm per annum. Lesseyton only receives summer rainfall whereas Willowvale receives summer and some winter rainfall (Mucina and Rutherford 2006).

Due in part to this climatic difference, there was lower wild leafy vegetable consumption in terms of number of households, amount consumed and frequency of consumption in Lesseyton. Households

consumed one species of wild leafy vegetables (*Amaranthus lividus*) only, during the third assessment of the study which was in the rainy season, while those in Willowvale consumed twelve species of wild leafy vegetables in all four assessments. The characteristics of *Amaranthus lividus* such as drought tolerance (Jansen van Rensburg *et al.* 2007), allow it to thrive in Lesseyton because it is a seasonal plant that grows naturally in most parts of South Africa (Dweba and Mearns 2011, Hart and Vorster 2006). It is very nutritious and easy to prepare (Maundu *et al.* 2009).

In Willowvale, wild vegetables had the highest contribution to vegetable consumption for afflicted households. Shackleton *et al.* (2007a) found that more than 90 % of households made use of wild leafy vegetables in the Ntubeni and Cwebe areas of the Transkei Wild Coast which are areas neighbouring villages in Willowvale. Literature on HIV/AIDS suggest that households affected by the pandemic have income problems because of having fewer or no income earners, high dependency ratios, high medical bills, and funeral expenses (Twine and Hunter 2011, Nguthi and Niehof 2008, Gillespie and Kadiyala 2005). Kaschula (2008) found that wild leafy vegetables were the most consumed wild food by afflicted households which is similar to the findings of this study. This shows the safety net aspect of wild foods (Shackleton and Shackleton 2004) as they are an important food security coping strategy. Wild leafy vegetables can grow on nutrient-deficient soils, do not need a lot of resources and inputs for production and are available for consumption when conventional vegetables such as spinach (*Spinacea oleracea*) and cabbage (*Brassica oleracea*) are not (Dweba and Mearns 2011).

The climatic conditions in Willowvale make it conducive for a number of wild vegetables to grow in the area. Out of the twelve species consumed by households, only one species *Larpoetea penduncularis*, known as *ububazi* in isiXhosa, grows all year round (Dweba and Mearns 2011). The other species are available in different seasons of the year. Water supply in the area is generally good; hence households are able to grow vegetables in their gardens though differences in production between afflicted and non-afflicted households can be attributed to labour shortages in afflicted households (Kaschula 2008). The high transport and vegetable costs in Willowvale leave households with no option but to eat freely available wild leafy vegetables which probably explain the high consumption in terms of number of households, quantity and frequency of consumption of wild leafy vegetables. This is in line with the South African context as shown by Vorster *et al.* (2007) that, in areas where the cost of transport to formal markets is high, households tended to heavily depend on wild leafy vegetables more than conventional vegetables to meet their dietary needs.

Wild fruit consumption was only observed in Lesseyton with distinct differences between afflicted and non-afflicted households. Prickly pear had the highest contribution to overall fruit consumption (63 %) for afflicted households whereas purchased fruit had a very low contribution (2 %).

Similarly, Challe and Price (2009) in Tanzania found that individuals from HIV/AIDS afflicted households gathered wild edible orchids more frequently than those from non-afflicted households. The results show that wild foods are indispensable and used more frequently by households that are or have experienced a shock (Paumgarten 2006). Household income is generally used as a proxy indicator of household food security (Kaschula and Shackleton 2012, Frongillo and Nanama 2006). The low contribution of purchased fruit for afflicted households could be due to limited household income which is exacerbated by effects of HIV/AIDS thus worsening the already existing conditions.

2.5.3 Food consumption patterns

Results from the food security questionnaire showed that more than 60 % of the respondents in the two study sites consumed three meals a day. However, there were some differences in responses for individuals that ate less than three meals a day between the two study sites. Most of those in Lesseyton ate fewer meals out of choice, and food availability was not a limiting factor. Respondents in Willowvale, which is a former homeland characterised by high levels of poverty and food insecurity (Aliber 2003), stated insufficient income and inability to produce their own food due to lack of resources and inputs as the two reasons that limit the number of meals they eat per day. The consumption of snacks between meals was done sometimes and the majority of households could only afford to buy them after they receive their social grant pay outs, remittances and salaries. The perception of snacks as 'luxury' items shows that households have limited household income which they can only use to buy basic food stuffs and this reiterates findings by Twine and Hunter (2011).

The school feeding programme in both sites proved to be effective because they provide children with food that they sometimes do not get at home. Times when schools are in session are also seasons of 'abundance' because most school children said they get an additional meal during the school term. For example, in Willowvale, where household meat and fruit consumption were low, school children were fed with meat which is a good source of protein and fruit which is a vital source of vitamins and other micro-nutrients.

2.5.4 Food quantities

HIV/AIDS significantly reduces a household's capacity to earn income (SADC FANR Vulnerability Assessment Committee 2003). HIV/AIDS afflicted households are known to have less economically active members and more dependents, and sometimes productive time is spent caring for the ill thus reducing the ability of a household to earn income (Gillespie and Kadiyala 2005, Batchmann and Booyesen 2004). In this study, more than 80 % of respondents from afflicted and non-afflicted households in both Willowvale and Lesseyton were classified as food secure based on the kilocalories they consumed and their MUAC measurements. Yet their diets were only moderately balanced. In age groups where there were significant differences between individuals

from afflicted and non-afflicted households in both sites, those from non-afflicted households had higher food consumption than those from afflicted households. These discrepancies could be due to the negative effects of HIV/AIDS on household income since the bulk of their food is purchased, thus threatening their food security.

Individuals from Willowvale had lower daily food intake than those from Lesseyton. Evidence from this study suggests that poverty and level of urbanisation have impacts on food security because Lesseyton is more urbanised than Willowvale therefore the prices of food items are generally more affordable than in Willowvale. The majority of the people in the Willowvale area are poor (Stats SA 2008, Andrew 2003) hence their ability to purchase sufficient food to meet their dietary requirements is very low. Similarly, Aliber (2009) found that poor rural households spend a significantly large proportion of their household expenditure to get a satisfactory food basket because food prices are generally higher in rural areas.

2.5.5 Household size

Comparisons between the two study sites showed no significant difference in mean household size, averaging approximately four household members, yet in Lesseyton, afflicted households had a significantly larger household size. This is similar to findings by Nguthi and Niehof (2008), who in their study in Central Kenya found HIV/AIDS afflicted households were significantly larger than non-afflicted ones. In this study, the relatively larger household size for afflicted households could be attributed to the adoption of orphans or dependents in the household which could potentially have a bearing on food security. On the other hand, the similarity in household size between afflicted and non-afflicted households in Willowvale could be due to the presence of an HIV/AIDS related death which has the potential to decrease household size (Yamano and Jayne 2004). In this case, the generally small household size could be a result of subtraction of household members due to HIV/AIDS related deaths in afflicted households and migration in search of employment in non-afflicted households.

2.5.6 Perceptions and experiences of food security

The majority of respondents from afflicted households in both Willowvale and Lesseyton felt they had insufficient food at home. This concurs with the results obtained from the measurements of food consumed because individuals from afflicted households generally had lower kilocalorie intakes than those from non-afflicted households. Despite the fact that more than 80 % of respondents in both sites from afflicted households were classified as food secure, more than 50 % felt they had insufficient food at home. One would expect that respondents are food secure since they are able to meet their minimum daily energy requirements, but this was not the case. The definition given by FAO (1996) includes the terms 'food preferences' which broadens the definition of food security from mere access to the food preferred (Pinstrup-Andersen 2009). Brown *et al.* (1994) suggest that individuals with the same access to food, but different food preferences may

exhibit different levels of food security which could be a possible explanation for the above scenario.

The reasons given by respondents from afflicted and non-afflicted households (unemployment, reliance on social support grants only, large household sizes) as to why they felt they had insufficient food at home all zero down to limited household income. Limited income means that households also have limited choice in terms of the variety and amount of food items they can purchase. Households then resort to limited basic food stuffs that they can eat everyday to fill their stomachs which may not be necessarily what they prefer because certain food items are seen as 'luxuries'. These results concur with Twine and Hunter (2011) who found that afflicted households did not eat certain food items because they perceived them as 'luxury' items.

For respondents from non-afflicted households, the feeling of having insufficient food at home could be attributed to poverty. Sub-Saharan Africa is generally characterised by high levels of poverty which are often accelerated by shocks such as HIV/AIDS, drought and climate change (Paumgarten and Shackleton 2011, Günther and Harttgen 2009). The wealth status of a household has a great influence on its ability to respond to shocks with poor households having limited alternatives (Paumgarten and Shackleton 2011). For example, an increase in food prices or transport costs is a shock that a poor non-afflicted household can experience. Due to the limited alternatives to cope, expenditure on food can be cut significantly by scaling down to cheaper basic food stuffs with no variety thus limiting food preferences and lowering the food security level of household members.

A large proportion of respondents from afflicted (47 %) and non-afflicted (48 %) households in Willowvale remembered not having food at home "a few days ago". The similarity in the proportion of respondents with the same response shows that the negative effects of HIV/AIDS and those of poverty on food security are to a greater extent synonymous and cannot be easily distinguished. Poor households, HIV/AIDS afflicted households, female, elderly and child-headed are the most vulnerable in rural communities (Schatz *et al.* 2011, de Waal and Whiteside 2003). The analogous trend between individuals from afflicted and non-afflicted households means that a poor non-afflicted household can experience similar levels of food insecurity as an HIV/AIDS afflicted household.

In Lesseyton, the difference in responses from individuals from afflicted and non-afflicted households can again be clearly attributed to the negative effects of HIV/AIDS. The fact that most of the respondents from afflicted households remembered not having enough food at home "a few days ago" and those from non-afflicted households remembered not having enough food at home "a few months ago" reiterates that non-afflicted households are generally more food secure than afflicted households. Their having insufficient food at home "a few months ago" could have been

due to some unexpected event or purchase of an asset thus cutting down on available household income for that short period, otherwise they generally have sufficient food at home.

In terms of coping strategies employed by households, borrowing food or going to relatives emerged as the most common strategies in both sites for afflicted and non-afflicted households. Coping strategies “are activities that people choose as ways of living through difficult times caused by shocks to their normal means of livelihood and way of living” (IFRC 2006). The results obtained in the study concur with findings by Kaschula (2011) that socially acquired foods are indispensable for afflicted and non-afflicted households. The collection of wild foods was the second least common option for individuals in Lesseyton and among the top three options for individuals in Willowvale. This difference could be due to the limited and seasonal occurrence of wild foods in Lesseyton whereas in Willowvale, wild foods are a prime safety-net due to their abundance.

CHAPTER 3

The impacts of HIV/AIDS and climate variability on individual and household consumption, use and perceptions of wild foods



“I do not only like prickly pear but I also sell it so that I can get money to buy food and take care of my family because there are no jobs”.

Yongama, 31 year old man, Lesseyton

3.1 Introduction

Wild foods have been integral to household diets for millennia and indispensable sources of nutrition (Flyman and Afolayan 2006). They were eaten as snacks or main meals depending on household preferences and prevailing circumstances. Nowadays, in cities and developing nations, food intake encompasses a small number of widely cultivated staples such as maize, wheat, rice and processed foods, whereas wild foods provide a greater dietary diversity to local diets in many developing nations (Bharucha and Pretty 2010). Forests and other natural or semi-natural lands provide food and livelihoods for people in the form of non-timber forest products (NTFPs), which are strongly interlinked with food security, especially for highly vulnerable groups in most rural communities (Völker and Waibel 2010, Takasaki 2010, Shackleton *et al.* 2007b, Paumgarten 2005).

Wild vegetables, for example, are hardy, require very little care, and are reported to do better than cultivated species in areas with low or unreliable rainfall, which is common in many parts of southern Africa (Dweba and Mearns 2011, Vorster *et al.* 2007, Van Vuuren 2006). However, this latter claim has rarely been empirically tested (Shackleton *et al.* 2009, Dzerefos *et al.* 1995). Wild vegetable consumption is common in rural households, though not confined to them, because they are also an important food source for poor urban households (Vorster *et al.* 2007). They are also sources of income for those who trade in them (Oluoch *et al.* 2009). In south-west Nigeria, wild leafy vegetables are sold at higher prices than conventional vegetables during the dry season, thereby providing a valued source of income (Adebooye and Opabode 2004). Most wild vegetables grow during the rainy season and are frequently harvested and dried for use during the dry season (Yang and Keding 2009, Vorster *et al.* 2007). Some wild vegetables are also available when conventional vegetables such as cabbage and spinach are not (Dweba and Mearns 2011) and in South Africa, more than 90 % of rural households use them (Shackleton and Shackleton 2004, Shackleton 2003). More than 100 different plant species are consumed as wild vegetables in South Africa (Dweba and Mearns 2011).

Wild vegetables and fruits are high in vitamins, carotenoids, iron and other minerals that promote immunity against infections and are sometimes low or lacking in conventional foods (Fentahun and Hager 2009, Pasquini *et al.* 2009, Yang and Keding 2009). They also have significant quantities of crude protein, fat and oil (Oluoch *et al.* 2009). A portion of *Amaranthus* species, which is commonly consumed in sub-Saharan Africa as a green leafy vegetable, has 200 times more vitamin A and ten times more iron than the same-sized portion of cabbage (McGarry and Shackleton 2009). An orange has 57 mg/100 g of vitamin C whilst the baobab fruit (*Adansonia digitata*) has 360 mg/100 g which is six times more (Fentahun and Hager 2009). Carotenoids and vitamins play a pivotal role in both reducing the risk of infection and slowing the progression of HIV into AIDS (Himmelgreen *et al.* 2009, Barany *et al.* 2004). These, and other antioxidant micronutrients present in fresh fruits and vegetables, promote good health by assisting in the prevention of high blood

pressure, stimulating the immune system, improving drug metabolism and tissue regeneration (Himmelgreen *et al.* 2009, Barany *et al.* 2004). Despite being an important part of peoples' diets, there are very limited data on the actual amounts of wild vegetables consumed (Smith and Eyzaguirre 2007).

Insects, nuts, wild mushrooms and wild animals such as fish, birds and mammals provide the human body with proteins. Proteins are used to build and repair tissues, make enzymes, hormones, and are an important building block of bones, muscles, cartilage, skin, and blood (Beisel 2002). Approximately 1 069 species of wild mushrooms are consumed worldwide (Boa 2004), yet little is known about their contribution to household food security (Cunningham and Yang 2011). The *Psathyrella atroumbonata* mushroom has protein content that is 77 % higher than beef (Barany *et al.* 2004). Not only are wild mushrooms rich in protein, they are also good sources of vitamins and minerals which are not lost during cooking (Borah and Rahman 2011).

Fish and bush meat provide at least 20 % of household protein in many developing countries (WildFish Center 2005, FAO 2003). Fish not only provide protein, but are also a major source of micronutrients such as iron, iodine, zinc, calcium, vitamins and fatty acids which are essential for the development of the brain and the body (WildFish Center 2005). People with AIDS need up to 15 % more energy and 50 % more protein than those not affected (Barany *et al.* 2004) and wild products potentially provide cheap and accessible dietary supplements. Insects are also a good source of protein; for example, the protein content of termites is 42 % and some grasshoppers are more than 70 % (Makhado *et al.* 2009). A 100 grams portion of dried mopane worms contains 76 % of the daily protein requirements of an average human adult (Greyling and Potgieter 2004), which is much higher than protein sources from domestic animals and poultry products at around 35 – 45 %. The mopane worm (*Imbresia belina*) is consumed and marketed in Botswana, Zimbabwe and South Africa (Greyling and Potgieter 2004).

Households may increase the consumption of wild foods during difficult times and decrease when conditions improve (Kaschula 2008). de Merode *et al.* (2004) revealed that in the Democratic Republic Congo, wild foods become vital in the diet of households when agricultural products are scarce and households are susceptible to food shortages. Ngwenya and Mosepele (2007) found fishing to be an important safety net which reduced poverty for afflicted households in the Okavango Delta in Botswana. The 'safety net' aspect of wild foods following the impact of HIV/AIDS was documented by McGarry and Shackleton (2009) in the Eastern Cape province, where 56 % of children coming from HIV/AIDS afflicted households supplemented more than 50 % of their diets with wild foods which was approximately double that of non-afflicted households. In the southern highlands of Tanzania, Challe and Price (2009) found that 97 % of HIV/AIDS afflicted households practiced gathering of wild edible orchids as their main economic activity in comparison to 10 % of non-afflicted households.

Although wild foods are generally free to rural communities, various factors govern their collection and use. For example, gender sometimes differentiates use as some wild foods are classified as “women’s food” and others are only collected and consumed by men (Shackleton and Shackleton 2004). Wild vegetables, for example, are mostly collected by women and girls (Yang and Keding 2009), whilst hunting of wild animals is a male domain (White 2004). Wealth may also affect the collection and use of wild foods. Wild foods are mainly collected by poor and vulnerable households because of their economic significance (Hunter *et al.* 2008). At times this has led to the stigmatisation of wild foods as they are perceived as old-fashioned and poor peoples’ food (Jansen van Rensburg *et al.* 2007). Shava (2005) observed that in Zimbabwe, people believed that those who ate wild plant foods were poor and most likely to be HIV positive.

Age affects the type and quantity of wild foods consumed. Wild fruits, for example are often perceived as food for children who collect them while herding livestock (Shackleton *et al.* 2007a). Due to this perception, adults rarely go out to collect and eat wild fruits unless, (i) they are collected and brought home by children for household consumption or (ii) they are collected for sale (e.g. marula, prickly pear). The location of a settlement may also determine which wild foods they can access. The West African coastal countries, for instance, have easy access to wild fish hence the proportion of dietary protein that is derived from fish is usually high (World Fish Centre 2005). Similarly, in Zambia where the miombo woodlands are abundant, communities have access to wild mushrooms which they consume or sell to generate income (Cunningham and Yang 2011).

Whilst wild foods are an important food source for rural households, sufficient supply is not always assured. It depends on a number of social, economic and environmental factors which work together to continuously increase household vulnerability. A significant one is prevailing climate and its variability especially in semi-arid regions such as southern Africa. The intimate synergies between social (e.g. HIV/AIDS) and environmental factors (e.g. climate change and variability) make it difficult to consider them in isolation when analysing food acquisition strategies employed by vulnerable rural households (Shackleton and Shackleton 2012, Agrawal 2011).

Vulnerability is a broad concept with multiple contextual definitions. When narrowed down to climate change and variability, vulnerability occurs when people as individuals or social units have to face risks of harmful threats or shocks with inadequate capacity or ability to respond effectively (IPCC 2007). HIV/AIDS and climate variability have different impacts on different households and sometimes work simultaneously to increase livelihood vulnerability and food insecurity (Misselhorn 2005). Climate change and variability is a major challenge in sub-Saharan Africa with arid and semi-arid southern Africa being a region of particular concern. Under climate change, the region is predicted to get hotter and drier with increased rainfall variability (Stringer *et al.* 2009). South Africa is a semi-arid country with an average annual rainfall of 450 mm which is below the world

annual average of 860 mm and droughts are a regular and recurrent feature over most of the country (Benhin 2008). Under global climate change scenarios, rainfall in South Africa is projected to decline by 5 % to 10 % in areas that receive summer rainfall accompanied by an increasing frequency of droughts, floods and intense storms (IPCC 2007, DEAT 2006).

The projected increase in drought frequency and intensity is of concern for land-based livelihoods, especially those of the rural poor (Vetter 2009). Drought is a temporary deviation that occurs in both low and high rainfall climatic zones due to reduction in the amount of precipitation received over a season or a year (Mishra and Singh 2010). The United Nations Convention to Combat Drought and Desertification (UN Secretariat General 1994) defines drought as ‘the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems’. More locally, a drought is taken to be less than 75 % of mean rainfall during the period of scrutiny (Tyson 1986). Prolonged and catastrophic droughts can cause devastating and irreversible socio-economic impacts from which communities are sometimes unable to recover when normal climatic conditions return (Vetter 2009). This includes loss or marked reduction in crop yields, livestock numbers and water supply for small businesses.

Food insecurity has reoccurred in southern Africa intermittently over the last century mainly due to climate-induced factors and more recently, combined with HIV/AIDS (Bharucha and Pretty 2010). Rural households that depend on rain-fed subsistence agriculture are highly vulnerable and they struggle to produce sufficient food when conditions are favourable, therefore a shock such as climate variability or HIV/AIDS increases their vulnerability to other shocks (Shackleton and Shackleton 2012, Benhin 2008, Maunder and Wiggins 2006). It is however often difficult to clearly differentiate the impacts of drought on household food security from that of HIV/AIDS because the two shocks may work simultaneously to cause poor harvests, reduced incomes and increase household vulnerability (Shackleton *et al.* 2010, Drimie and Gillespie 2010). Food insecurity associated with drought and HIV/AIDS combined with poverty can increase households use and consumption of wild foods (Shackleton and Shackleton 2012, Völker and Waibel 2010).

HIV/AIDS, climate change and variability are some of the long wave stressors the world is facing today. Though these stressors share similarities and interactions their synergistic impacts on household food security have received very little analysis. On the other hand, the gathering and hunting of wild foods by rural people is widely recognised but, knowledge regarding the links between HIV/AIDS, climate variability and the use of wild foods to ensure food security is underdeveloped. This chapter therefore reports on peoples’ use and perceptions of wild foods and also aims to test the hypothesis that “vulnerability to HIV/AIDS and climate variability increases consumption and use of wild foods”. The research questions were:

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1. Do gender and household HIV/AIDS affliction status affect the consumption of wild foods?
 2. What are the main reasons why people consume or use wild foods?
 3. What are the most frequently harvested species for consumption?
 4. Do droughts affect some households more than the others and why?
 5. When harvests are poor due to droughts, what coping strategies do households adopt to access food?
 6. Do people perceive wild leafy vegetables to be more drought tolerant than conventional vegetables?

3.2.0 Approach

3.2.1 Wild foods

A questionnaire on wild foods was administered quarterly to each household member together with 48 hour dietary recall. For children below the age of six, parents or guardians were asked to respond on their behalf since they spend most of their time at home and eat food prepared for the household. The wild foods investigated were, wild animals, wild fish, birds, wild vegetables, mushrooms and wild fruits. The questionnaire broke down the general consumption and use of wild foods in the previous three months. Questions considered each type of wild food, species, how often, why they consume or use it and their perceptions of wild foods (see Appendix D). Wild foods were found to be consumed according to individual preferences hence the data were analysed at individual level only after grouping the respondents by age and household affliction status. The results presented in this chapter on the individual mean frequency of consumption are all per month for the 12 month study period and the individual mean seasonal frequencies of consumption are all per month in each season, with each season being three months long.

3.2.2 Climate change and variability

Climate change studies require long periods of time to ascertain the possible impacts on various aspects such as food security. It was not possible to investigate the impacts of climate change on food security because of the limited time for this study. Therefore, climate variability was investigated using a questionnaire which was administered once, in the second quarter, to the 155 household heads only. It had questions probing drought occurrences and coping strategies used for food access during droughts as a proxy of what may occur as climate change advances. The questionnaire also had a section asking respondents if some households were more affected by droughts and the causes thereof, along with a question about the drought tolerance of wild and conventional vegetables (see Appendix E).

3.3.0 Results

3.3.1 Wild meat

Hunting of wild animals was solely done by groups of males with the aid of dogs. Approximately 30 % of respondents from both afflicted and non-afflicted households in Lesseyton ate wild meat (Table 3.1) hence there were no significant differences ($\chi^2=0.512$; $df=1$; $p=0.474$). In Willowvale however, there were more respondents from non-afflicted households ($\chi^2=6.992$; $df=1$; $p=0.008$) who ate wild meat (Table 3.1). There were no respondents in the 2-3 years age groups in the two study sites and 19-30 years age group from afflicted households in Willowvale who ate wild meat.

Table 3.1: Proportion of respondents by age group who consumed wild meat

Age-group (years)	Willowvale		Lesseyton	
	Afflicted (%) (n=167)	Non-Afflicted (%) (n=184)	Afflicted (%) (n=162)	Non-Afflicted (%) (n=181)
2-3	0	0	0	0
4-8	3.7	8.0	9.7	5.0
9-13	22.2	34.4	26.7	50.0
14-18	30.0	45.5	41.7	42.9
19-30	0	30.8	36.1	33.3
31-50	11.8	14.3	40.0	17.6
51+	9.6	12.8	20.0	25.0
All ages	10.8	21.7	30.8	27.6

3.3.1.1 Frequency of wild meat consumption

Wild meat was consumed by approximately 17 – 37 % of males and 6 – 11 % of females from afflicted and non-afflicted households in Willowvale (Figure 3.1a) hence the proportion of males was significantly greater ($\chi^2=12.479$; $df=1$; $p<0.001$). Similarly, 39 – 52 % of males and 16 – 18 % of females from afflicted and non-afflicted households consumed wild meat in Lesseyton ($\chi^2=4.130$; $df=1$; $p=0.042$). In Willowvale, the frequency of wild meat consumption (Figure 3.1b) was 2 – 3 times per month for both male and female respondents in afflicted households ($t=0.239$; $df=19$; $p=0.814$). In non-afflicted households male respondents consumed wild meat two times per month whilst female respondents consumed wild meat 1 – 2 times per month though there were no significant differences ($t=1.185$; $df=57$; $p=0.241$). Male respondents from both afflicted and non-afflicted households in Lesseyton (Figure 3.1b) ate wild meat 2 – 3 times per month whilst female respondents ate it 1 – 2 times per month. Though the frequency of wild meat consumption was similar, there were no significant gender differences in afflicted households ($t=1.245$; $df=52$; $p=0.124$) yet non-afflicted households showed significant gender differences ($t=2.288$; $df=65$; $p=0.025$). Overall, male respondents in Lesseyton, regardless of household affliction status had a higher frequency of wild meat consumption ($t=2.504$, $df=135$; $p=0.013$).

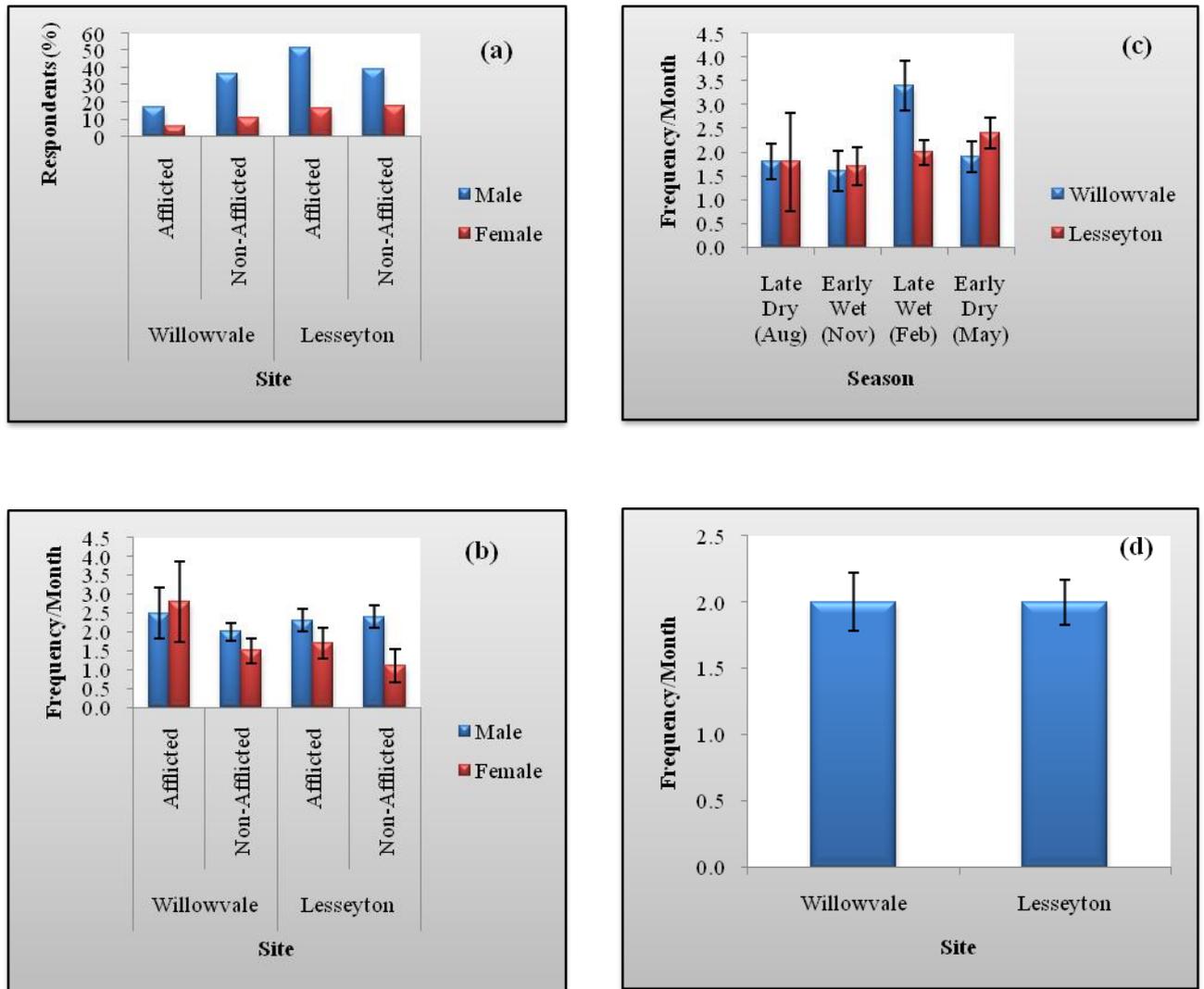


Figure 3.1: (a) Proportion of respondents who consumed wild meat in Willowvale and Lesseyton, (b) Mean (\pm SE) frequency of wild meat consumption based on household affliction status and gender, (c) Seasonal comparisons, (d) Comparisons between the two study sites

In Willowvale, individuals from afflicted households regardless of gender, consumed wild meat 1 – 2 times per month and those from non-afflicted households ate it 2 – 3 times per month though there were no significant differences ($t=1.806$; $df=78$; $p=0.075$). Similarly, in Lesseyton, respondents from afflicted households ate wild meat 2 – 3 times per month and those from non-afflicted households ate it 2 times per month hence there were no significant differences ($t=0.285$; $df=135$; $p=0.776$). Seasonal frequency of wild meat consumption in Willowvale (Figure 3.1c) was 1 – 4 times per month though there were no significant seasonal differences ($p=0.054$) and similarly in Lesseyton seasonal frequency of wild meat consumption was 1 – 3 times per month showing no significant differences ($p=0.529$). Overall frequency of wild meat consumption was twice per month for the two study sites irrespective of gender, household affliction status and season (Figure 3.1d) hence there were no significant differences ($t=0.086$; $df=215$; $p=0.931$).

3.3.1.2 Reasons for wild meat consumption

Wild meat was mostly consumed in Willowvale and Lesseyton because it is free, nutritious and respondents like it (Table 3.2). However, none of the respondents from afflicted households in Willowvale ate wild meat because it is nutritious. There were more individuals from afflicted households that ate wild meat because of insufficient food at home in both Willowvale ($\chi^2=94.609$; $df=4$; $p<0.001$) and Lesseyton ($\chi^2=50.337$; $df=4$; $p<0.001$). Those that ate wild meat because they followed others to hunt were mostly boys between the ages of 8 and 18 years.

Table 3.2: Reasons for consumption of wild meat

Reason for consumption	Willowvale		Lesseyton	
	Afflicted (%) (n=18)	Non-Afflicted (%) (n=40)	Afflicted (%) (n=50)	Non-Afflicted (%) (n=50)
Free	100.0	100.0	100.0	100.0
Like wild meat	77.6	93.4	74.4	91.9
Insufficient food	44.2	19.8	26.3	7.8
Follow others	43.8	32.7	35.6	40.3
Nutritious	0	58.1	61.8	50.4
For selling	0	0	0	0
Sent by parents	0	0	0	0
Cultural purposes	0	0	0	0

3.3.1.3 Frequently consumed wild animal species

A total of twelve mammalian species were consumed in Willowvale, whilst in Lesseyton there were nine (Table 3.3). Generally, the species consumed were markedly different between the study sites though there were some similarities.

Table 3.3: Wild animals consumed in Willowvale and Lesseyton

Common Name	Scientific Name (Skinner and Chimimba 2005, Feely 2009)	Local Name	Willowvale	Lesseyton
Aardvark	<i>Orycteropus afer</i>	Ihodi		✓
Blesbok	<i>Damaliscus pygargus phillipsi</i>	Ilinqa	✓	
Blue duiker	<i>Cephalophus monticola</i>	Iphuthi	✓	
Bushbuck	<i>Tragelaphus scriptus</i>	Imbabala	✓	
Bushpig	<i>Potamochoerus porcus</i>	Ingulube	✓	✓
Chacma baboon	<i>Papio hamadryas</i>	Imfene		✓
Common grey duiker	<i>Sylvicapra grimmia</i>	Impunzi	✓	✓
Genet cat	<i>Genetta</i> spp.	Inyhwagi	✓	
Greater cane rat	<i>Thryonomys swinderianus</i>	Idwele	✓	
Ground squirrel	<i>Geosciurus inauris</i>	Unomatse		✓
Hare	<i>Lepus</i> spp.	Umvundla	✓	✓
Kudu	<i>Tragelaphus strepsiceros</i>	Iqudi		✓
Porcupine	<i>Hystrix africae-australis</i>	Incanda		✓
Rock Hyrax	<i>Procavia capensis</i>	Imbila	✓	✓
Tree Hyrax	<i>Dendrohyrax arboreus</i>	Umqha	✓	
Vervet monkey	<i>Cercopithecus pygerythrus</i>	Inkawu	✓	
Water mongoose	<i>Atilax paludinosus</i>	Umhlangala	✓	

3.3.2.0 Wild birds

Wild bird consumption was common among children less than 18 years of age (Table 3.4). Proportions of respondents who ate wild birds showed no significant differences between afflicted and non-afflicted households in both Willowvale ($\chi^2=0.064$; $df=1$; $p=0.799$) and Lesseyton ($\chi^2=0.027$; $df=1$; $p=0.868$). Hunting of wild birds was done irregularly in and around the homestead. The majority of respondents who consumed wild birds were in the 9-13 years age group. In Willowvale, consumption of wild birds was observed in the 2-3 years age group in afflicted households only and in the 51+ years age group in both afflicted and non-afflicted households. All respondents in the 51+ years age group ate helmeted guinea fowl (*Numida meleagris*) which was consumed as relish in their households.

Table 3.4: Proportion of respondents by age group who consumed wild birds

Age-group (years)	Willowvale		Lesseyton	
	Afflicted (%) (n=167)	Non-Afflicted (%) (n=184)	Afflicted (%) (n=162)	Non-Afflicted (%) (n=181)
2-3	16.7	0	0	0
4-8	18.5	32.0	25.8	20.0
9-13	50.0	34.4	73.3	67.9
14-18	30.0	22.7	25.0	14.3
19-30	4.0	4.8	2.8	3.0
31-50	0	0	0	0
51+	1.9	7.4	0	0
All ages	13.8	14.7	16.1	15.5

3.3.2.1 Frequency of wild bird consumption

Approximately 25 % of males and 5 – 9 % of females in both afflicted and non-afflicted households in Willowvale and Lesseyton ate wild birds (Figure 3.2a). However, there were no gender differences in both afflicted and non-afflicted households in Willowvale ($\chi^2=0.184$; $df=1$; $p=0.668$) and Lesseyton ($\chi^2=0.216$; $df=1$; $p=0.642$). Males from afflicted and non-afflicted households in the two study sites consumed wild birds 3 – 4 times a month whilst females consumed wild birds 2 – 4 times a month (Figure 3.2b). The frequency of wild bird consumption was not significant between males and females in afflicted ($t=1.430$; $df=27$; $p=0.164$) and non-afflicted households ($t=0.291$; $df=32$; $p=0.773$) in Willowvale, and in afflicted ($t=0.916$; $df=30$; $p=0.367$) and non-afflicted households ($t=0.567$; $df=41$; $p=0.574$) in Lesseyton (Figure 3.2b). Respondents from afflicted and non-afflicted households in Willowvale and Lesseyton regardless of gender ate wild birds 3 – 4 times a month and showed no significant differences ($t=0.921$; $df=61$; $p=0.361$) and ($t=1.054$; $df=73$; $p=0.295$) respectively. Males and females in Willowvale and Lesseyton irrespective of household affliction status, ate wild birds 3 times a month showing no gender differences in the two study sites; ($t=0.347$; $df=61$; $p=0.730$) and ($t=0.221$; $df=73$; $p=0.826$) respectively.

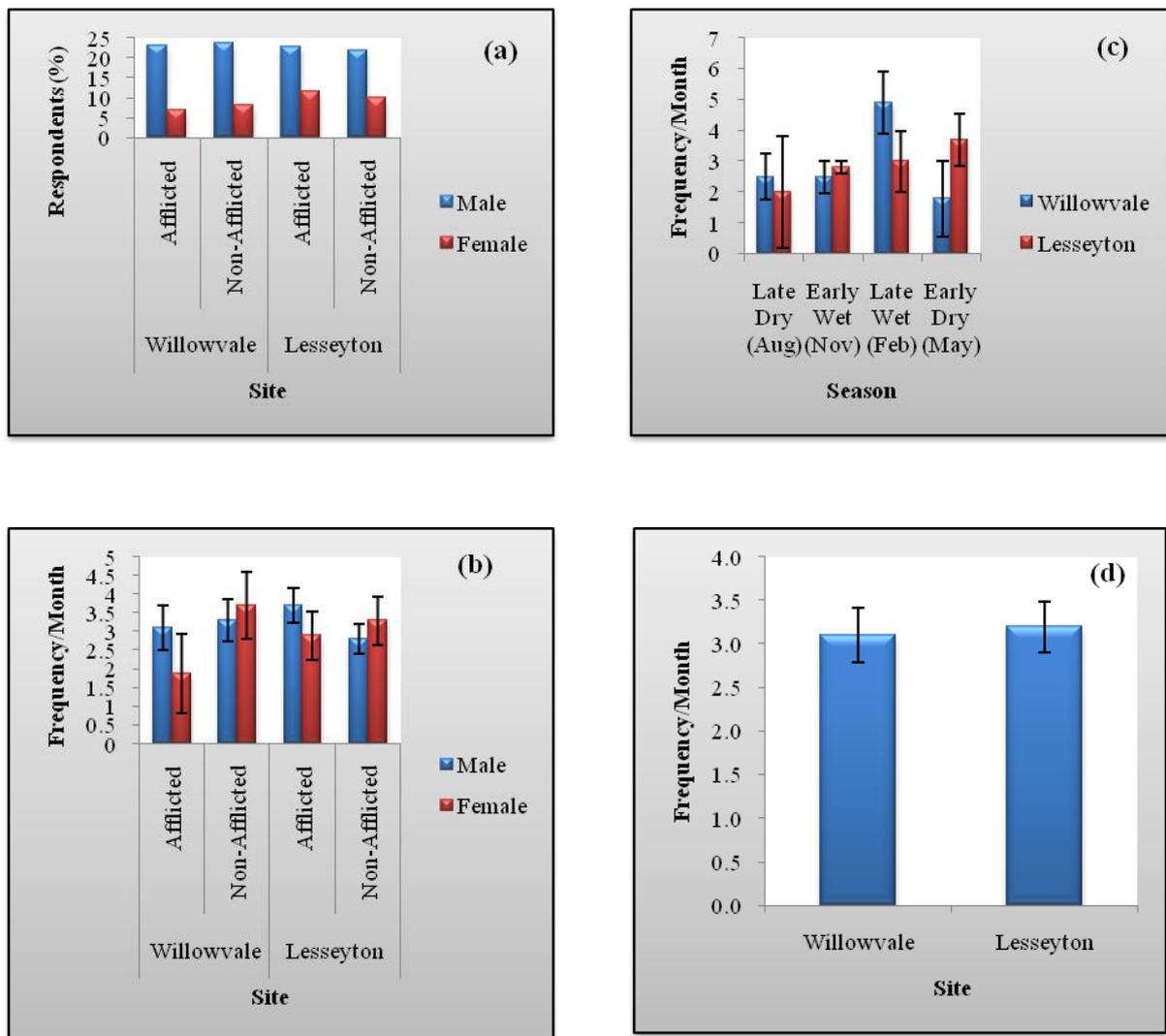


Figure 3.2: (a) Proportion of respondents who consumed wild birds in Willowvale and Lesseyton, (b) Mean (±SE) frequency of wild bird consumption based on household affliction status and gender, (c) Seasonal comparisons, (d) Comparisons between the two study sites

Seasonal consumption of wild birds was 2 – 5 times per month in Willowvale (Figure 3.2c) hence there were significant seasonal differences ($p=0.007$). In Lesseyton however, seasonal consumption of wild birds was 2 – 4 times per month and there were no seasonal differences ($p=0.427$). The frequency of wild bird consumption irrespective of household affliction status, gender and season; was 3 times per month in both Willowvale and Lesseyton (Figure 3.2d) hence there were no differences between the two study sites ($t=0.103$; $df=136$; $p=0.918$).

3.3.2.2 Reasons for wild bird consumption

All individuals from afflicted and non-afflicted households ate wild birds because they had free access to them (Table 3.5). Other reasons given by majority of respondents include that they like eating them and they have copied general practice in the community. There were more individuals from afflicted

households who ate wild birds because of insufficient food at home in both Willowvale ($\chi^2=48.283$; $df=4$; $p<0.001$) and Lesseyton ($\chi^2=35.461$; $df=4$; $p<0.001$).

Table 3.5: Reasons from wild bird consumption

Reason for consumption	Willowvale		Lesseyton	
	Afflicted (%) (n=23)	Non-Afflicted (%) (n=27)	Afflicted (%) (n=26)	Non-Afflicted (%) (n=28)
Free	100.0	100.0	100.0	100.0
Follow others	73.9	51.9	73.1	89.3
Like to eat birds	62.5	85.2	100.0	92.9
Insufficient food	30.4	18.5	19.2	7.1
Nutritious	4.3	33.3	26.9	14.2
For selling	0	0	0	0
Sent by parents	0	0	0	0
Cultural purposes	0	0	0	0

3.3.2.3 Frequently consumed wild bird species

A total of fourteen wild bird species were consumed in Willowvale whilst in Lesseyton only three bird species were consumed (Table 3.6). Whether this reflects higher avifaunal biodiversity in Willowvale or more conservative tastes in Lesseyton is unknown.

Table 3.6: Wild bird species consumed in Willowvale and Lesseyton

Common Name	Scientific Name (Chittenden and Upfold 2007)	Local Name	Willowvale	Lesseyton
African Pied Wagtail	<i>Motacilla aguimp</i>	Umcelu	✓	
Barn Swallow	<i>Hirundo rustica</i>	Inkonjane	✓	
Cape Sparrow	<i>Passer melanurus</i>	Inggabe/Unondlwana	✓	✓
Cape Turtle-Dove	<i>Streptopelia capicola</i>	Ihobe	✓	✓
Cape Wagtail	<i>Motacilla capensis</i>	Umcelu	✓	
Cloud Cisticola	<i>Cisticola textrix</i>	Igqaza	✓	
Common Quail	<i>Coturnix coturnix</i>	Isagwityi	✓	
Dark-capped Bulbul	<i>Pycnonotus tricolor</i>	Ikhwebula	✓	
Helmeted Guineafowl	<i>Numida meleagris</i>	Impangele	✓	
Knysna Turaco	<i>Tauraco corythaix</i>	Igolomi	✓	
Mountain Wagtail	<i>Motacilla clara</i>	Umcelu	✓	
Neddicky	<i>Cisticola fulvicapilla</i>	Incede	✓	✓
Red-necked spurfowl	<i>Pternistis afer</i>	Inkwali	✓	
Southern Boubou	<i>Laniarius ferrugineus</i>	Igqubusha	✓	

3.3.3.0 Wild fish and shell fish

Fishing was only done in Willowvale because streams, rivers and the coast were in reasonable proximity for most households which was not the situation in Lesseyton. Fishing was done by males using fishing rods which were either purchased or donated by tourists visiting the Kobb Inn Hotel. Collection of shellfish was done by both males and females but was dominated by females. There were more respondents from afflicted households ($\chi^2=10.937$; $df=1$; $p=0.001$) who consumed wild fish (Table 3.7).

Table 3.7: Proportion of respondents by age group who consumed wild fish

Age-group (years)	Willowvale	
	Afflicted (%) (n=167)	Non-Afflicted (%) (n=184)
2-3	40.7	9.1
4-8	60.7	12.0
9-13	66.7	46.9
14-18	45.0	27.3
19-30	28.6	26.9
31-50	47.2	38.1
51+	46.2	23.4
All ages	42.5	27.7

3.3.3.1 Frequency of wild fish consumption

Approximately 50 % of males and females from afflicted and non-afflicted households ate wild fish and shellfish (Figure 3.3a) and there were no significant gender differences ($\chi^2=3.029$; $df=1$; $p=0.820$). Male respondents from afflicted households consumed wild fish and shellfish 3 – 4 times per month (Figure 3.3b), whilst females consumed them 1 – 2 times per month ($t=-3.083$; $df=99$; $p=0.003$). Similarly, in non-afflicted households males ate wild fish and shellfish 3 – 4 times per month (Figure 3.3b), whilst females consumed them 1 – 2 times per month ($t=2.098$; $df=81$; $p=0.039$).

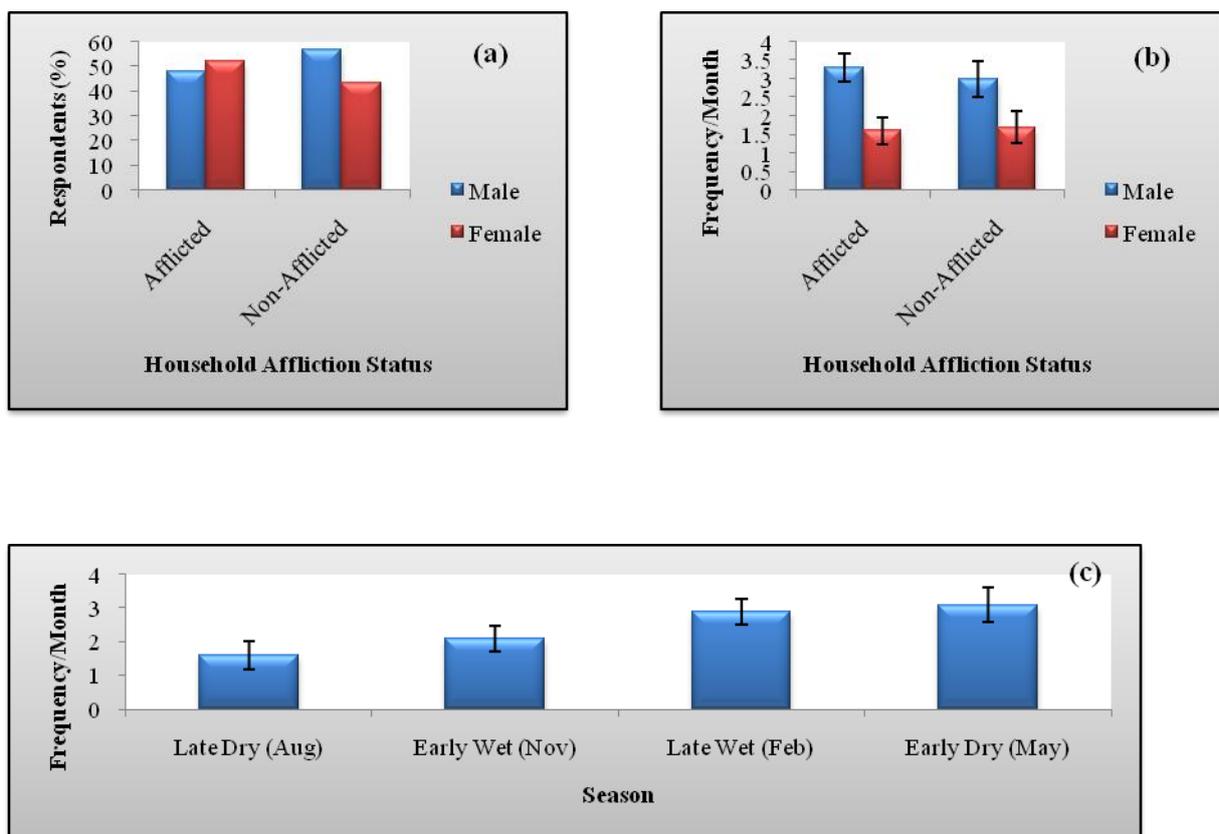


Figure 3.3: (a) Proportion of respondents who consumed wild fish in Willowvale, (b) Mean (\pm SE) frequency of wild fish consumption based on household affliction status and gender, (c) Seasonal comparisons

Individuals from afflicted and non-afflicted households consumed wild fish and shellfish 2 – 3 times per month irrespective of gender ($t=0.027$; $df=182$; $p=0.979$). The highest frequency of wild fish consumption was 3 – 4 times per month in the early dry season (Figure 3.3c) and the lowest was 1 – 2 times per month in the late dry season hence there were significant seasonal differences ($p=0.039$).

3.3.3.2 Reasons for wild fish and shellfish consumption

Majority of respondents from afflicted households ate wild fish and shellfish because they are free and food is insufficient at home, whereas those from non-afflicted households ate wild fish and shellfish because they are free and nutritious (Table 3.8). There were more respondents from afflicted households who ate wild fish and shellfish because of insufficient food at home ($\chi^2=65.134$; $df=5$; $p<0.001$). However, approximately 13 % of individuals from non-afflicted households said they purchase wild fish and shellfish from local fishermen and 14 % of respondents from afflicted households sold wild fish and shellfish.

Table 3.8: Reasons for wild fish and shellfish consumption

Reason for consumption	Afflicted (%) (n=71)	Non-Afflicted (%) (n=51)
Free	100.0	86.7
Insufficient food	54.9	31.4
Like to eat wild fish	47.9	21.6
Nutritious	39.4	68.6
For selling	14.1	0
Following others	9.9	13.7
Sent by parents	0	0
Cultural purposes	0	0

3.3.3.3 Frequently consumed wild fish species

A total of five wild fish species were consumed by respondents in Willowvale (Table 3.9).

Table 3.9: Wild fish species consumed in Willowvale

Common Name	Scientific Name (Schultz 2004, Schultz 2004)
Blacktail	<i>Diplodus sargus capensis</i>
Common bream	<i>Abramis brama</i>
Kob	<i>Argyrosomus thorpei</i>
Mullet fish	<i>Mugil cephalus</i>
Shad	<i>Pomatomus saltatrix</i>
Shellfish	-

3.3.4.0 Wild leafy vegetables

More than 75 % of respondents from afflicted and non-afflicted households in Willowvale and Lesseyton ate wild leafy vegetables. Collection of wild leafy vegetables was done by women in home gardens and abandoned fields. In Lesseyton, the proportion of respondents from afflicted households who ate wild leafy vegetables was greater ($\chi^2=4.969$; $df=1$; $p=0.026$), whilst in Willowvale there were

no significant differences ($\chi^2=1.099$; $df=1$; $p=0.295$) between the two categories of households (Table 3.10).

Table 3.10: Proportion of respondents by age groups who consumed wild vegetables

Age-group (years)	Willowvale		Lesseyton	
	Afflicted (%) (n=167)	Non-Afflicted (%) (n=184)	Afflicted (%) (n=162)	Non-Afflicted (%) (n=181)
2-3	100.0	100.0	100.0	100.0
4-8	96.3	96.0	96.8	90.0
9-13	94.4	93.8	76.5	85.7
14-18	85.0	72.7	83.3	67.9
19-30	76.2	92.3	86.1	69.4
31-50	88.2	90.5	93.3	86.2
51+	84.6	93.6	90.0	83.3
All ages	88.0	91.3	89.0	80.1

3.3.4.1 Frequency of wild leafy vegetable consumption

Approximately 82 % of male respondents and more than 90 % of female respondents from afflicted and non-afflicted households ate wild leafy vegetables (Figure 3.4a) in Willowvale and there were no gender differences ($\chi^2=0.278$; $df=1$; $p=0.598$). In Lesseyton, more than 70 % of both male and female respondents from afflicted and non-afflicted households ate wild leafy vegetables hence there were no significant proportion differences ($\chi^2=2.979$; $df=1$; $p=0.084$). In Willowvale (Figure 3.4b), female respondents in afflicted and non-afflicted households consumed wild leafy vegetables 7 – 8 times per month whilst male respondents consumed wild leafy vegetables 5 – 6 times per month ($t=2.674$; $df=346$; $p=0.008$) and ($t=-3.936$; $df=443$; $p<0.001$) respectively. In Lesseyton (Figure 3.4b) however, both female and male respondents in afflicted and non-afflicted households ate wild leafy vegetables 5 – 6 times per month hence there were no significant gender differences in both afflicted ($t=0.932$; $df=308$; $p=0.352$) and non-afflicted households ($t=-0.644$; $df=246$; $p=0.520$). Individuals from afflicted households in Lesseyton regardless of gender, consumed wild leafy vegetables 5 – 6 times per month and those from non-afflicted households ate wild leafy vegetables 4 – 5 times per month ($t=2.467$; $df=556$; $p=0.014$).

In Willowvale however, there were no significant differences ($t=-1.756$; $df=791$; $p=0.079$) with respondents from both afflicted and non-afflicted households consuming wild leafy vegetables 6 – 7 times per month. Seasonal consumption was 6 – 8 times per month in Willowvale and 5 – 7 times per month in Lesseyton (Figure 3.4c). Comparisons showed no significant seasonal differences in either Willowvale ($p=0.253$) or Lesseyton ($p=0.165$). In Willowvale, regardless of household affliction status, gender and season, respondents consumed wild leafy vegetables 3 – 4 times per month (Figure 3.4d) which was higher than 2 – 3 times per month for Lesseyton respondents ($t=-2.154$; $df=257$; $p=0.032$).

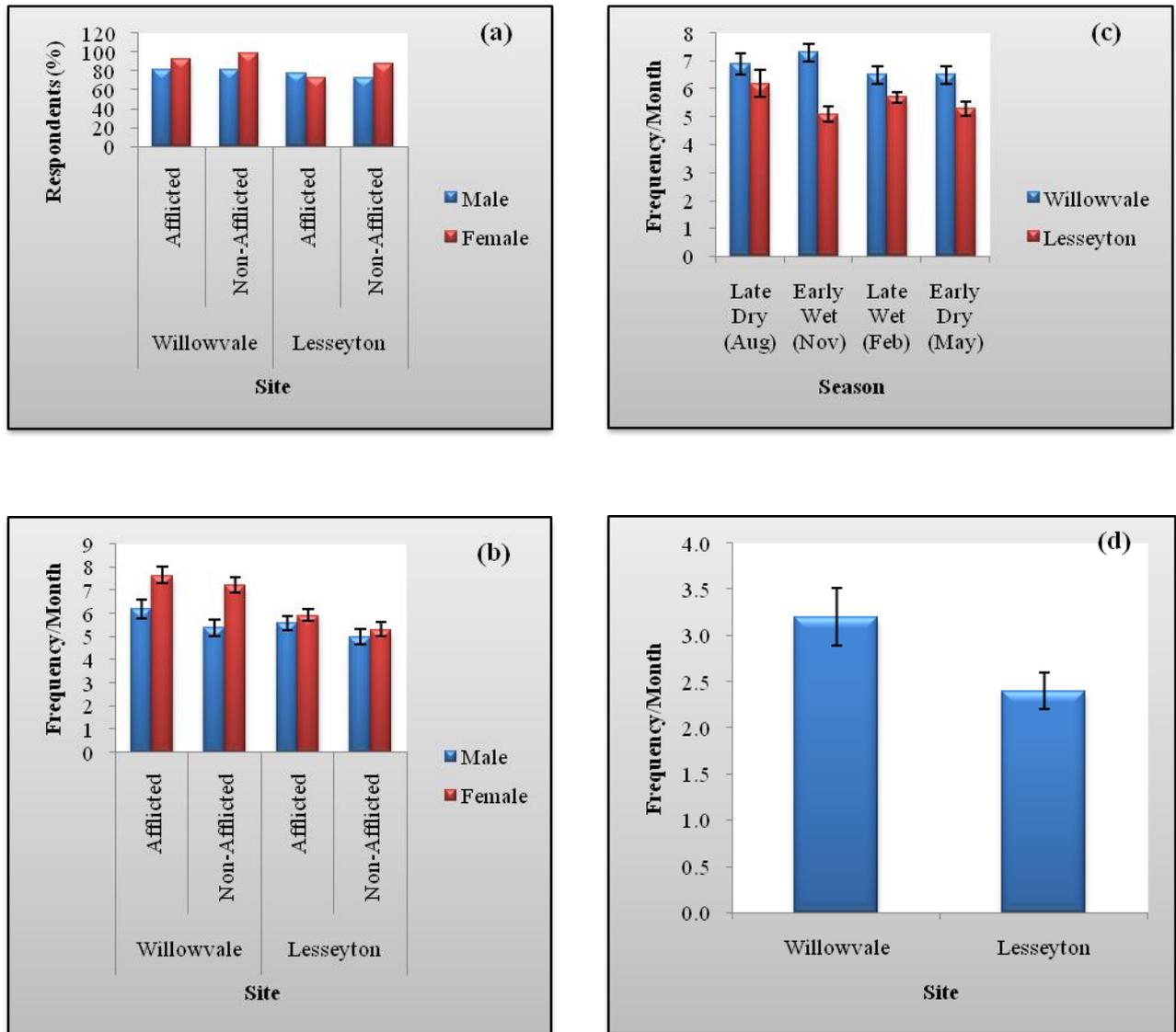


Figure 3.4: (a) Proportion of respondents who consumed wild leafy vegetables in Willowvale and Lesseyton, (b) Mean (\pm SE) frequency of wild leafy vegetable consumption based on household affliction, status and gender, (c) Seasonal comparisons, (d) Comparisons between the two study sites.

3.3.4.2 Reasons for wild leafy vegetable consumption

All individuals from afflicted and non-afflicted households ate wild leafy vegetables because they are free and the majority also said they liked wild leafy vegetables and they are nutritious (Table 3.11). There were more respondents from afflicted households who ate wild leafy vegetables because of insufficient food at home in Willowvale ($\chi^2=96.190$; $df=3$; $p<0.001$) and Lesseyton ($\chi^2=322.923$; $df=3$; $p<0.001$).

Table 3.11: Reasons for wild leafy vegetable consumption

Reason for consumption	Willowvale		Lesseyton	
	Afflicted (%) (n=147)	Non-Afflicted (%) (n=168)	Afflicted (%) (n=144)	Non-Afflicted (%) (n=145)
Free	100.0	100.0	100.0	100.0
Like to eat	89.8	91.7	88.2	94.5
Insufficient food	81.6	28.9	87.5	15.9
Nutritious	61.9	63.7	70.6	68.3
Following others	0	0	0	0
Sent by parents	0	0	0	0
For selling	0	0	0	0
Cultural purposes	0	0	0	0

3.3.4.3 Frequently consumed wild leafy vegetable species

Eleven species of wild leafy vegetables were consumed in Willowvale whereas in Lesseyton, only one species was listed (Table 3.12).

Table 3.12: Wild leafy vegetables consumed in Willowvale and Lesseyton

Common Name	Scientific Name (Dweba and Mearns 2011, Shackleton <i>et al.</i> 2009, Jansen van Rensburg <i>et al.</i> 2007)	Local Name	Willowvale	Lesseyton
Blackjack	<i>Bidens pilosa</i>	Umhlabangulo	✓	
Centalla	<i>Centalla asiatica</i>	Nongobozana	✓	
Fourleaf allseed	<i>Polycarpon tetraphyllum</i>	Impontshani	✓	
Milk thistle	<i>Sonchus oleraceus</i>	Ihlaba	✓	
Mustard	<i>Erucastrum strigosum</i>	Isiqashomba	✓	
Nightshade	<i>Solanum nigrum</i>	Umsobo	✓	
Pigweed	<i>Amaranthus lividus</i>	Imbuya/Utyuthu	✓	✓
Pigweed	<i>Amaranthus viridis</i>	Nomdlomboyi	✓	
River nettle	<i>Laportea penduncularis</i>	Ububazi	✓	
Tree spinach	<i>Chenopodium giganteum</i>	Imbilikicane	✓	

3.3.5.0 Wild fruits

Approximately 50 % of respondents in Willowvale and 80 % in Lesseyton from afflicted and non-afflicted households ate wild fruits. However, there were more respondents from non-afflicted households who ate wild fruits in Willowvale ($\chi^2=4.043$; $df=1$; $p=0.044$), whereas in Lesseyton there were no significant differences ($\chi^2=1.729$; $df=1$; $p=0.188$) (Table 3.13). In Willowvale, wild fruits were mostly eaten by children and consumption by adults was opportunistic. Wild fruits were not harvested and brought home for consumption. In Lesseyton however, harvesting of wild fruits was mostly done by males and brought home for consumption.

Table 3.13: Proportion of respondents by age group who consumed wild fruits

Age-group (years)	Willowvale		Lesseyton	
	Afflicted (%) (n=167)	Non-Afflicted (%) (n=184)	Afflicted (%) (n=162)	Non-Afflicted (%) (n=181)
2-3	16.7	9.1	45.5	35.7
4-8	59.3	72.0	93.5	65.0
9-13	88.9	78.1	76.5	89.3
14-18	75.0	81.8	83.3	78.6
19-30	47.6	69.2	75.0	77.8
31-50	35.3	42.9	93.3	64.1
51+	28.8	51.4	93.3	91.7
All ages	48.8	58.7	82.9	77.4

3.3.5.1 Frequency of wild fruit consumption

A greater proportion of males consumed wild fruits in both afflicted and non-afflicted households (Figure 3.5a) in Willowvale ($\chi^2=4.038$; $df=1$; $p=0.044$), whereas in Lesseyton there were no significant gender differences ($\chi^2=0.939$; $df=1$; $p=0.333$).

Male and female respondents from afflicted and non-afflicted households in Willowvale ate wild fruits 8 – 10 times per month (Figure 3.5b), hence there were no significant gender differences in afflicted ($t=0.254$; $df=128$; $p=0.803$) and non-afflicted households ($t=0.810$; $df=155$; $p=0.419$). In Lesseyton however, male respondents ate wild fruits 6 – 7 times per month with female respondents eating them 4 – 5 times per month hence there were marked gender differences in both afflicted ($t=2.517$; $df=257$; $p=0.013$) and non-afflicted households ($t=2.181$; $df=258$; $p=0.030$). Individuals from afflicted and non-afflicted households in Willowvale, regardless of gender ate wild fruits 8 – 9 times per month therefore no significant differences were observed in the frequency of wild fruit consumption ($t=0.535$; $df=285$; $p=0.593$). Similarly in Lesseyton, there were no significant differences between respondents from afflicted and non-afflicted households ($t=1.259$; $df=517$; $p=0.209$) because they all consumed wild fruits 5 – 6 times per month. In Willowvale, the highest frequency of wild fruit consumption was 10 – 11 times per month in the late dry season and the lowest was 6 – 7 times per month in the late wet season (Figure 3.5c), hence there was significant seasonal variation ($p=0.004$). Similarly in Lesseyton, the highest frequency of wild fruit consumption was 6 – 7 times per month in the late dry season and there was no wild fruit consumption in the early wet season hence the significant variation ($p<0.001$).

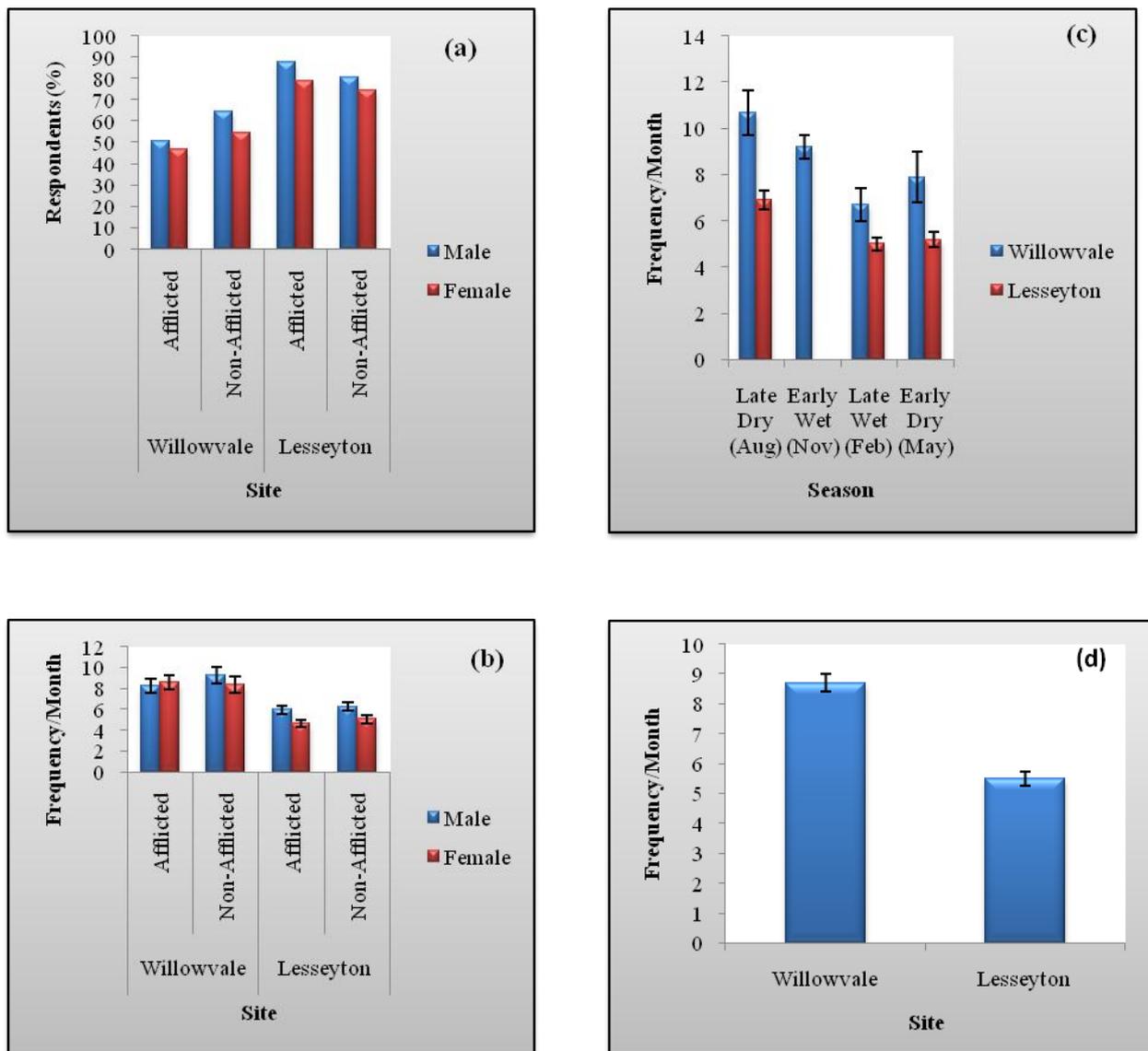


Figure 3.5: (a) Proportion of respondents who consumed wild fruits in Willowvale and Lesseyton, (b) Mean (±SE) frequency of wild fruit consumption based on household affliction status and gender, (c) Seasonal comparisons, (d) Comparisons between the two study sites

Comparisons between the two study sites regardless of household affliction status, gender and season (Figure 3.5d) showed that respondents from Willowvale consumed wild fruits more frequently at 8 – 9 times per month than those from Lesseyton who only ate wild fruits 5 – 6 times per month ($t=8.482$; $df=804$; $p<0.001$).

3.3.5.2 Reasons for wild fruit consumption

All individuals in Willowvale and most in Lesseyton ate wild fruits because they had free access to them (Table 3.14). Nice taste was also mentioned by nearly all respondents. No respondents in Willowvale ate wild fruits because of insufficient food at home ($\chi^2=4.492$; $df=3$; $p=0.213$), whereas in Lesseyton, less than 10 % of respondents from afflicted and non-afflicted households did so

($\chi^2=121.245$; $df=6$; $p<0.001$). The majority of respondents liked wild fruits because they are nutritious. A few individuals in Lesseyton sold wild fruits for income. Those that followed others to harvest wild fruits were children and others were sometimes sent by their parents to collect wild fruits. All respondents from afflicted households in Lesseyton ate wild fruits because there were free whilst 28 % from non-afflicted households purchased them.

Table 3.14: Reasons for wild fruit consumption

Reason for consumption	Willowvale		Lesseyton	
	Afflicted (%) (n=82)	Non-Afflicted (%) (n=108)	Afflicted (%) (n=134)	Non-Afflicted (%) (n=140)
Free	100.0	100.0	100.0	72.6
Like	97.5	98.1	97.8	96.4
Follow others	51.3	39.8	32.4	32.1
Nutritious	18.8	24.1	88.2	85.7
For selling	0	0	33.7	7.1
Insufficient food	0	0	9.6	3.6
Sent by parents	0	0	7.4	5.0
Cultural purposes	0	0	0	0

3.3.5.3 Frequently consumed wild fruit species

Six wild fruit species were consumed in Willowvale whilst in Lesseyton only one wild fruit was consumed (Table 3.15).

Table 3.15: Wild fruits consumed in Willowvale and Lesseyton

Common Name	Scientific Name (Palgrave and Palgrave 2002)	Local Name	Willowvale	Lesseyton
Cat-thorn	<i>Scutia myrtina</i>	Isiphingo	✓	
Coast red milk wood	<i>Mimusops caffra</i>	Intunzi	✓	
Fig	<i>Ficus sur</i>	Amakwane	✓	
Natal milk plum	<i>Englerophytum natalensis</i>	Intongwane	✓	
Prickly pear	<i>Opuntia ficus-indica</i>	Itolofiya		✓
Wild bramble	<i>Rubus rigidus</i>	Amaqunube	✓	
Wild plum	<i>Harpephyllum caffrum</i>	Ingwenye	✓	

3.3.6.0 Wild Mushrooms

Only a minority of respondents at both sites ate wild mushrooms (Table 3.16). More respondents from afflicted households in Willowvale ate wild mushrooms ($\chi^2=6.606$; $df=1$; $p=0.010$), whilst in Lesseyton they were only consumed by individuals from afflicted households ($\chi^2=23.459$; $df=1$; $p<0.001$). Collection was opportunistic and the wild mushrooms were brought home for preparation. Depending on the quantities, wild mushrooms were consumed by the entire household but when the quantity was small, the collector would eat them alone.

Table 3.16: Proportion of respondents by age groups who consumed wild mushrooms

Age-group (years)	Willowvale		Lesseyton	
	Afflicted (%) (n=167)	Non-Afflicted (%) (n=184)	Afflicted (%) (n=162)	Non-Afflicted (%) (n=181)
2-3	33.3	0	0	0
4-8	29.4	8.0	9.7	0
9-13	27.8	12.5	6.7	0
14-18	20.0	18.2	12.5	0
19-30	23.8	7.7	8.3	0
31-50	11.8	4.8	13.3	0
51+	19.2	21.3	10.0	0
All ages	21.0	12.5	21.0	0

3.3.6.1 Frequency of wild mushroom consumption

Approximately 15 – 25 % of male respondents and 11 – 20 % of female respondents from afflicted and non-afflicted households in Willowvale ate wild mushrooms (Figure 3.6a) hence, there were more males who consumed wild mushrooms ($\chi^2=11.836$; $df=1$; $p<0.001$). The frequency of wild mushroom consumption was 1 – 2 times per month (Figure 3.6b) for both male and female respondents in afflicted ($t=1.627$; $df=43$; $p=0.111$) and non-afflicted households ($t=0.298$; $df=27$; $p=0.768$) in Willowvale and Lesseyton ($t=1.721$; $df=16$, $p=0.104$). Individuals from afflicted and non-afflicted households in Willowvale regardless of gender, ate wild mushrooms 1 – 2 times per month hence there were no significant differences ($t=0.872$; $df=72$; $p=0.386$). Similarly, seasonal frequency of consumption was 1 – 2 times per month (Figure 3.6c) in both Willowvale ($p=0.413$) and Lesseyton ($p=0.374$), and comparisons between the two sites showed no significant differences ($t=0.085$; $df=90$; $p=0.933$) irrespective of gender, household affliction status and season (Figure 3.6d).

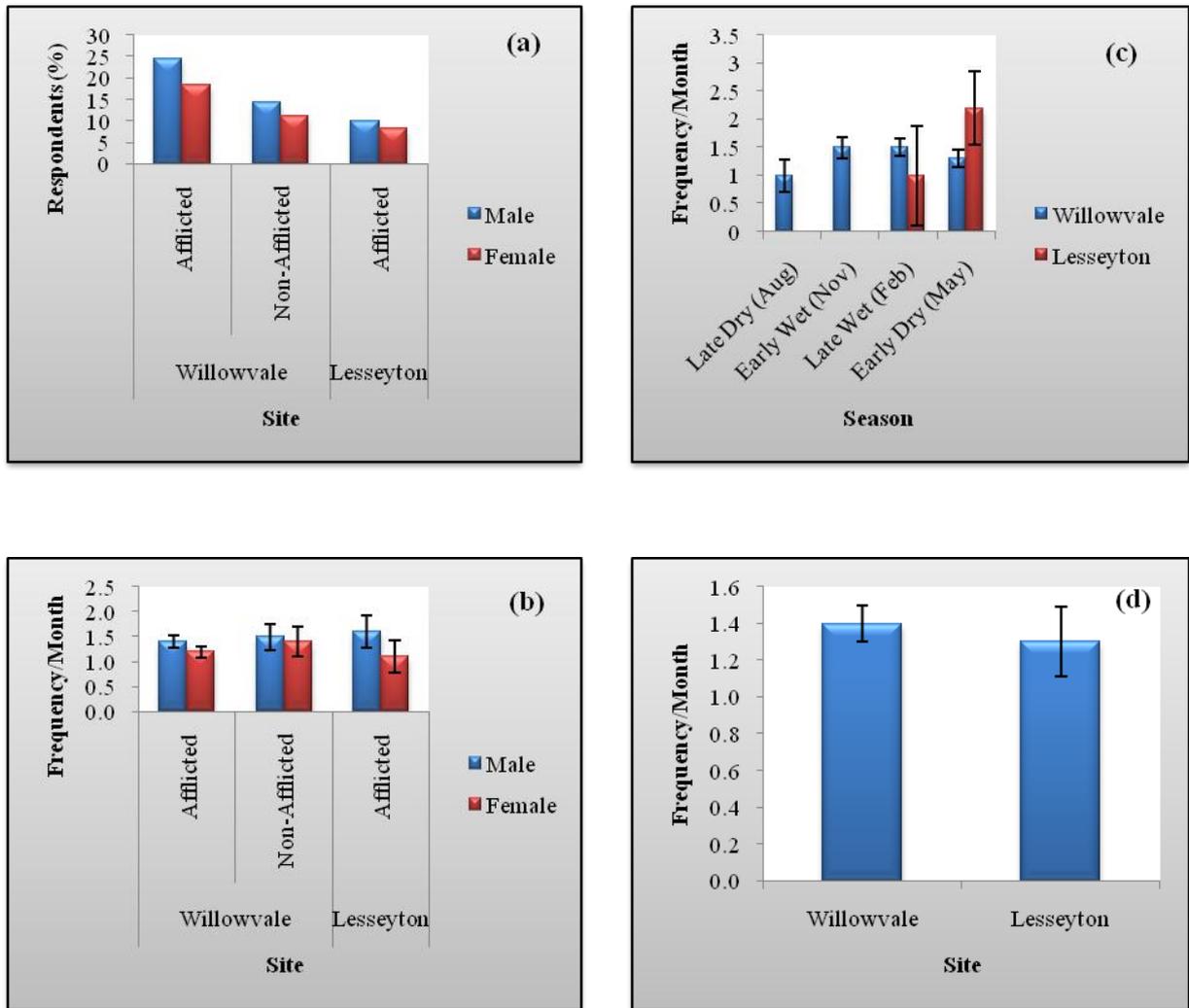


Figure 3.6: (a) Proportion of respondents who consumed wild mushrooms in Willowvale and Lesseyton, (b) Mean (\pm SE) frequency of wild mushroom consumption based on household affliction status and gender, (c) Seasonal comparisons, (d) Comparisons between the two study sites

3.3.6.2 Reasons for wild mushroom consumption

All respondents ate wild mushrooms because there are free and most liked them (Table 3.17). Those from afflicted households in Willowvale ate them because of insufficient food at home ($\chi^2=36.280$; $df=3$; $p<0.001$).

Table 3.17: Reasons for wild mushroom consumption

Reason for consumption	Willowvale		Lesseyton
	Afflicted (%) (n=35)	Non-Afflicted (%) (n=23)	Afflicted (%) (n=34)
Free	100.0	100.0	100.0
Like	94.3	92.0	93.3
Insufficient food	25.7	0	0
Nutritious	8.6	52.0	66.7
Follow others	0	0	0
For selling	0	0	0
Sent by parents	0	0	0
Cultural purposes	0	0	0

3.3.7 Summary of wild food consumption

The majority of respondents in Willowvale and Lesseyton ate wild leafy vegetables and wild fruits (Table 3.18). The least consumed wild foods were wild birds in Willowvale and wild mushrooms in Lesseyton.

Table 3.18: Proportions of respondents and wild foods consumed

Wild food	Willowvale			Lesseyton		
	Afflicted (%)	Non-Afflicted (%)	Total (%)	Afflicted (%)	Non-Afflicted (%)	Total (%)
Wild meat	10.8	21.7	16.5	30.8	27.6	29.5
Wild birds	13.8	14.7	14.2	16.1	15.5	15.7
Wild fish	42.5	27.2	34.5	0.0	0.0	0.0
Wild mushrooms	21.0	12.5	16.5	21.0	0.0	9.9
Wild leafy vegetables	88.0	91.3	89.7	89.0	80.1	84.3
Wild fruits	48.8	58.7	54.1	82.9	77.4	79.9

There were very clear gender differences, albeit not always statistically significant (Table 3.19). At both sites a greater proportion of males than females consumed each wild food type except for wild vegetables in Willowvale.

Table 3.19: Gender and wild foods consumed

Wild food	Willowvale			Lesseyton		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
Wild meat	27.6	8.7	16.5	44.6	17.4	29.5
Wild birds	23.5	7.8	14.2	22.3	10.8	15.7
Wild fish	41.4	27.2	34.5	0.0	0.0	0.0
Wild mushrooms	19.3	14.6	16.5	11.5	8.7	9.9
Wild leafy vegetables	81.4	95.6	89.7	89.0	80.1	84.3
Wild fruits	56.9	51	54.1	83.8	76.9	79.9

3.3.8 Coping strategies adopted for food access during droughts

There was a variation in response as to whether drought affects some households more than others (Table 3.20). In Willowvale, the majority of afflicted households said droughts affects some households more than others whereas a larger proportion of non-afflicted households said droughts affect all households similarly ($\chi^2=41.002$; $df=2$; $p<0.001$). In Lesseyton, there were similar proportions of afflicted households who responded “yes” and “no” to the question whereas the proportion of non-afflicted households that disagreed was larger ($\chi^2=10.631$; $df=2$; $p=0.005$). For those that said droughts affect some households more than others, a larger proportion of afflicted and non-afflicted households in Willowvale attributed it to households being poor ($\chi^2=30.428$; $df=4$; $p<0.001$) because droughts prevent them from harvesting anything from their fields (Table 3.20). However, 15.6 % of afflicted households and 25 % non-afflicted households also said those with livestock were the most affected because droughts cause grazing and water shortages that lead to a marked reduction in livestock numbers. The majority of households in Lesseyton (Table 3.20) said those with livestock were the most affected by droughts ($\chi^2=3.734$; $df=1$; $p=0.053$). Chronic illness was cited by more non-afflicted households in both sites.

Table 3.20: Do droughts affect some households more than the others?

		Willowvale		Lesseyton	
		Afflicted (%) (n=40)	Non-Afflicted (%) (n=43)	Afflicted (%) (n=28)	Non-Afflicted (%) (n=44)
Response	Yes	52.5	27.9	39.2	43.2
	No	40.0	39.5	39.2	45.5
	Do not know	7.5	32.6	21.6	11.3
Reason	Poor	40.6	37.5	0	0
	No livestock	21.9	12.5	0	0
	No labour	21.9	12.5	0	0
	Have livestock	15.6	25.0	91.9	85.0
	Chronic illness	0	12.5	8.1	15.0

A significantly larger proportion of afflicted households in Willowvale (Table 3.21) typically do nothing to cope with droughts whilst non-afflicted households increase the quantity of food purchases, engage in casual labour or borrow food ($\chi^2=38.889$; $df=7$; $p<0.001$). In Lesseyton (Table 3.21) a larger proportion of afflicted households have stopped growing crops whilst non-afflicted mostly do nothing to cope with droughts although some stop cropping or buy supplementary feed ($\chi^2=53.994$; $df=3$; $p<0.001$). Overall, Willowvale households employ a greater range of strategies than Lesseyton households.

Table 3.21: Coping strategies employed by households in Willowvale and Lesseyton

Strategy	Willowvale		Lesseyton	
	Afflicted (%) (n=40)	Non-Afflicted (%) (n=43)	Afflicted (%) (n=28)	Non-Afflicted (%) (n=44)
Nothing	30.6	17.7	40.0	52.2
Increase food purchases	12.9	25.8	12.0	4.3
Increase wild vegetables consumption	12.9	4.8	0	0
Borrow food	11.0	17.7	0	0
Engage in casual labour	9.7	16.1	0	0
Skip meals	9.7	6.5	0	0
Sell livestock	8.1	4.8	0	0
Replant	4.8	6.5	0	0
Buy livestock supplementary feed	0	0	4.0	21.7
Stop growing crops	0	0	44.0	21.7

3.3.9 Drought tolerance of vegetables

More than 75 % of households in both sites felt that wild leafy vegetables were more drought tolerant than conventional vegetables (Figure 3.7). However, there were more afflicted households in both Willowvale ($\chi^2=9.898$; $df=1$; $p=0.002$) and Lesseyton ($\chi^2=17.089$; $df=1$; $p<0.001$) who perceived wild leafy vegetables to be more drought tolerant than conventional vegetables. Households said wild vegetables do not need watering and they are available for consumption during droughts.

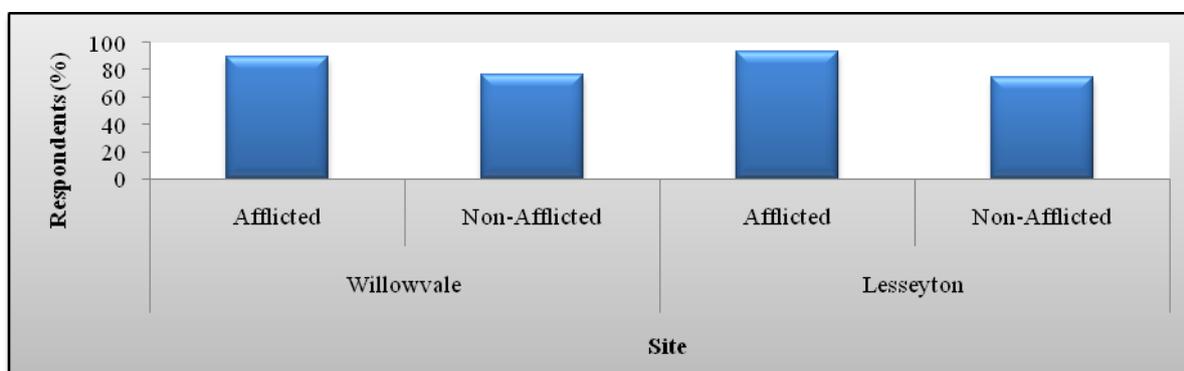


Figure 3.7: Proportion of respondents and perception of drought tolerance of wild vegetables

3.4.0 Discussion

3.4.1 Gender and consumption of wild foods

Wild animals, wild birds, wild fish and wild mushrooms are vital sources of protein in many rural households (FAO 2012). However, the amounts consumed vary temporally and spatially, and are determined primarily by availability, socio-economic status and cultural factors (FAO 2012). There were more male respondents who ate wild meat in the two study sites and their frequency of wild meat and wild fish consumption was also higher. In Willowvale only, there were more males who consumed wild fruits and wild mushrooms, whereas in Lesseyton no differences were observed in the proportions of male and female respondents who ate wild leafy vegetables, wild birds, wild fruits, wild mushrooms and wild fish. The gender differences in wild meat and wild fish consumption can be attributed to the fact that hunting of wild animals and fishing is a male domain (Ngwenya and Mosepele 2007, White 2004). In most cases, hunted meat is eaten in the forest by the hunters and it is not taken home for household consumption, hence the higher frequency of consumption. This concurs with findings by White (2004) who found that boys and men ate wild meat more often than women in Transkei (South Africa). Another factor was that some respondents said culturally, a Xhosa woman was not allowed to eat wild meat; however this depended on which clan one came from or was married into.

Wild leafy vegetables and wild fruits are high in vitamins and minerals. Results from this study showed significant gender differences, with females consuming wild leafy vegetables more frequently than males in Willowvale and in Lesseyton males consumed wild fruits more frequently than females. Wild leafy vegetables were collected by women and girls in Willowvale which concurs with findings by Lewu and Mavengahama (2011), Jansen van Rensburg *et al.* (2007), and Vorster *et al.* (2007). Wild leafy vegetables are perceived as “women’s food” just as wild animals are perceived as “men’s food” and men consider wild leafy vegetables to be inferior and will only eat them when there is no other option. Jansen van Rensburg *et al.* (2007) aptly point out that wild leafy vegetables tend to be regarded as food for females. Prickly pear was mostly collected by males because the process is laborious and the spines are dangerous. However, household consumption depended on the quantities collected and therefore sometimes consumption would be done in the wild and none would be brought home hence the higher frequency of consumption by males. Similarly, Shackleton *et al.* (2011) found that both males and females were involved in harvesting of prickly pear. Contrary to these findings, Kalaba *et al.* (2009) found women and children accounted for over 80 % of fruit collectors in the Copperbelt province of Zambia. In Willowvale, there were more male respondents who ate wild fruits. This could possibly be due to the larger proportion of male respondents who go to the forest to hunt, herd livestock and cut fencing poles.

3.4.2 HIV/AIDS affliction status and consumption of wild foods

Similar to the findings of Kaschula and Shackleton (2009) and White (2004), hunting in Willowvale and Lesseyton was done in groups with the assistance of dogs. Therefore a hunting group could be made up of males from afflicted and non-afflicted households, possibly accounting for the insignificant differences in the frequency of wild animal consumption between males from afflicted and non-afflicted households. In the case of wild fish and wild mushrooms, the harvest was taken home but household consumption was said to be dependent on the quantity collected, therefore if the quantity was small, only the person who caught it would eat it, who in most cases was male if it was wild fish.

There were more respondents from non-afflicted households who ate wild meat in Willowvale but in Lesseyton, there were no significant differences. This difference in Willowvale could possibly be due to absence of males and household labour shortages in afflicted households due to HIV/AIDS related mortality. This is in line with McGarry and Shackleton (2009) who found that HIV/AIDS afflicted households sometimes decreased consumption of wild foods due to stigma from the community and labour shortages for collection. However, this contradicts findings by Hunter *et al.* (2007) where, HIV/AIDS afflicted households consumed more wild foods than non-afflicted households. However, Kaschula and Shackleton (2012) found this effect was not manifest with respect to bush meat use across several sites in South Africa, and cautioned that responses to HIV/AIDS vulnerability may not be the same for every single resource or food type or community.

Wild birds were consumed mostly by children. Adults said wild birds were “children’s food” and the majority last ate them when they were children. Consumption patterns were similar for children from afflicted and non-afflicted households. This was probably because hunting was opportunistic and done in groups hence the children shared their catch. Groups could have been composed of children from both afflicted and non-afflicted households hence the similarities in frequency of consumption. However, these results contradict the findings of McGarry and Shackleton (2009) that children from afflicted households consumed wild birds more frequently than those from non-afflicted households.

Wild animals, birds, fish and mushrooms were consumed all year round by respondents from both afflicted and non-afflicted households in Willowvale. However, wild mushrooms were only consumed by respondents from afflicted households only in Lesseyton, during the late wet and early dry season. They did not eat them because of insufficient food at home mainly because they collected small quantities that could not supplement food for the household. Nonetheless, the proportion of afflicted household members who ate wild mushrooms and wild fish was higher than that of non-afflicted households in Willowvale. This concurs with Hunter *et al.* (2011), Mutunje *et al.* (2010), Challe and Price (2009) and McGarry and Shackleton (2009) who found that HIV/AIDS affected households increased reliance on wild foods to mitigate food insecurity.

There were more respondents from afflicted households who ate wild leafy vegetables in Lesseyton. They also consumed wild leafy vegetables more often than those from non-afflicted households. This concurs with results from chapter two where afflicted households consumed purchased and wild leafy vegetables because they did not have the capacity to produce their own. This shows that wild leafy vegetables provide a free fall back for vulnerable households to use in times of crisis (Völker and Waibel 2010) since the majority of respondents from afflicted consumed wild vegetables because of insufficient food at home. This echoes findings by Twine and Hunter (2011) where 97 % of afflicted households compared to 72 % of non-afflicted households; made regular use of wild leafy vegetables in the Limpopo Province. Similarly Kaschula (2008), found wild leafy vegetables to be the most consumed wild food by afflicted households in KwaZulu-Natal and Eastern Cape provinces.

3.4.3 Reasons for wild food consumption

It is widely known that wild foods are often more nutritious than conventional foods (Borah and Rahman 2011, Pasquini *et al.* 2009, Oluoch *et al.* 2009, Flyman and Afolayan 2006). There were variations in the reasons given by respondents for the consumption of wild foods. These differences could possibly be accounted for by social stigmas associated with wild food consumption. For example, Shava (2005) observed that in Zimbabwe, people believed that those who ate wild plant foods were poor and most likely to be HIV positive. Bharucha and Pretty (2010) also point out that the focus on the contribution of agriculture to food security has resulted in the under-estimation of the value of wild foods. On the other hand, there were more respondents from afflicted households who ate wild animals, wild birds, wild fish and wild mushrooms because of insufficient food at home. This shows the pivotal role that wild foods play as a free safety net in ensuring food security when households are exposed to a shock such as HIV/AIDS (Takasaki 2011, Twine and Hunter 2011, Ezebilo and Mattsson 2010, McGarry and Shackleton 2009, Kaschula 2008). Selling of wild fish was only done by respondents from afflicted households to supplement household income. This concurs with Ngwenya and Mosepele (2007) where access to fish for household consumption and sale was an indispensable safety net for afflicted households in the Okavango Delta. Similarly, Challe and Price (2009) found that 97 % of HIV/AIDS afflicted in Tanzania, gathered wild edible orchids as their main economic activity compared to 10 % of non-afflicted households.

Wild leafy vegetables were consumed more frequently by respondents from Willowvale. This concurs with the 48 hour dietary observations in chapter two and can be pointed to the rural setting of Willowvale which affects the access to markets and the prices of vegetables. In addition, Willowvale is endowed with a variety of wild leafy vegetables species that grow throughout the year because of the conducive climatic conditions and provide a free source of vitamins and minerals to households when they cannot afford conventional vegetables. This is in line with the South African context as shown by Vorster *et al.* (2007) that, in areas where the cost of transport to formal markets is high, households tended to depend more on wild leafy vegetables more than conventional vegetables to

meet their dietary needs. On the contrary, Lesseyton is peri-urban, has limited wild leafy vegetables because of its arid nature, markets are easily accessible and the prices of vegetables are much lower than in Willowvale.

The results from the study showed that some respondents from afflicted households sold prickly pear to generate income and some respondents from non-afflicted households bought prickly pear for consumption. This shows that prickly pear is a valuable resource for vulnerable households because it is not only a free source of vitamins but it also provides income. Shackleton *et al.* (2011) reported that income generated from prickly pear trade contributed significantly to livelihoods in the Makana Municipality of the Eastern Cape. Similarly, Twine and Hunter (2011) found that 87 % of afflicted households in the Limpopo used *marula* fruit for eating, making jam and beer brewing. The majority of the respondents perceived wild fruits and wild vegetables to be healthy because they are strongly encouraged to eat them when they visit health centres. This is in agreement with Faber *et al.* (2010) who reported that clinics and radio were indispensable sources of information on the nutritional value of wild vegetables in KwaZulu-Natal province.

3.4.4 Species consumed

Generally, respondents in Willowvale consumed more species in every food class than those in Lesseyton. This suggests that Willowvale has higher species richness that can be attributed to its rural location, richer biodiversity, more intact environment and a more conducive climate. Disturbance and erosion levels are minimal, averaging approximately 20 %, primarily because of clearing land for cultivation (Mucina and Rutherford 2006). On the contrary, Lesseyton is peri-urban, has stronger seasonality of rainfall, more extreme temperatures and higher drought frequency because of its aridity. These factors combined with landscape transformation, cultivation and a rapid rate of urbanisation lead to lower species richness (Mucina and Rutherford 2006). Levels of erosion in Lesseyton are high, averaging approximately 54 % due to overgrazing by goats (Mucina and Rutherford 2006).

3.4.5 Coping strategies

There are a myriad of factors that increase the inability of households to cope and access food when there is drought. Food shortages caused by drought and HIV/AIDS combined with poverty can promote a variety of coping responses (e.g. Akrofi *et al.* 2012), including an increase in households' wild food use and consumption (Shackleton and Shackleton 2012, Ezebilo and Mattsson 2010). On the other hand, use and consumption of wild foods can decrease due to HIV/AIDS because of declines in household labour (Kaschula 2008). Poverty in this context is defined as “the inability of individuals, households or entire communities to command sufficient resources to satisfy sufficiently acceptable minimum standards of living” (May *et al.* 1998). A significantly larger proportion of afflicted households in Willowvale cited that poor households and those without livestock and labour were the most affected by droughts mainly because they have limited or no safety nets to use as a

fallback when shocks strike. Generally, livestock ownership is used as an indicator of household wealth in this region (Shackleton and Shackleton 2006) therefore if a household has no livestock it is usually classified as poor. The absence of labour in afflicted households can be pointed to the loss of household members due to HIV/AIDS related mortality or morbidity due to chronic illness (Kaschula 2008). Secondly, most of the labour needed for household agricultural production is done by household members with women often providing the bulk of it (Charman 2008). In the advent of HIV/AIDS the agricultural labour that women provide is compromised and limited because they have to care for the sick (Mashiri *et al.* 2009). Households may also reduce the area they cultivate or resort to less demanding activities due to HIV/AIDS prevalence (Ogunmefun and Schatz 2009), therefore when there is a drought their harvests are poor and food security is heavily compromised. This could also account for the larger proportion of afflicted households in Lesseyton that do not grow crops when there are droughts.

Households' responses to shocks may vary depending on the nature and intensity of the shock, household attributes and assets (Paumgarten 2005), therefore an afflicted household may respond in a similar or different manner to a non-afflicted household. In this study, households used a combination of strategies to cope with droughts which is in line with findings by Paumgarten and Shackleton (2011) where the majority of households in two villages of the Eastern Cape and Limpopo provinces, used a range of strategies to cope with crop failure and livestock deaths. However, a large proportion of afflicted household in Willowvale and non-afflicted households in Lesseyton do nothing to cope with droughts. This could suggest that afflicted households in Willowvale feel helpless because they do not have viable safety nets which can cushion them when they are affected by shocks such as droughts whilst non-afflicted households in Lesseyton have other sources of income that make it easy for them to purchase food because crop production is not a priority. The Eastern Cape is the poorest province in South Africa and the population is largely rural (Stats SA 2011). Livelihoods in the rural areas of the Eastern Cape are typically a combination of subsistence agriculture, livestock rearing, petty trading, wage employment, social grants, remittances, gathering of non-timber forest products and inter-household transfers (Shackleton and Shackleton 2004). When there is a drought, there are limited or no returns from subsistence agriculture, livestock rearing and non-timber forest products, hence households are forced to make use of the limited resources they have.

3.4.6 Drought tolerance of vegetables

The majority of afflicted households in both Willowvale and Lesseyton said wild vegetables were more drought tolerant than conventional vegetables such as spinach and cabbage because they do not need watering and are readily available for household consumption during droughts. Whilst an often repeated claim in ethnobotanical literature, there has been very little empirical research to substantiate the better drought tolerance of wild leafy vegetables (Shackleton *et al.* 2009, Dzerefos *et al.* 1995). Wild leafy vegetables help households to cope with temporary and permanent setbacks such as death

or retrenchment of a breadwinner (Twine and Hunter 2011, McGarry and Shackleton 2009, Kaschula 2008), droughts, floods, crop failure and livestock deaths (Hunter *et al.* 2011, Paumgarten and Shackleton 2011, Shackleton and Shackleton 2004). *Amaranthus* species which are commonly consumed wild leafy vegetables are drought tolerant and can withstand adverse climatic conditions (Jansen van Rensburg *et al.* 2007). These results corroborate with findings by Muller and Almedom (2008); and Odhav *et al.* (2007) who reported that households relied heavily on wild vegetables during famines and periods of food shortages such that they even ate rarely consumed wild plants. However, knowledge and use of such rarely used plants is dwindling as local ecological knowledge declines with modernisation, changing food habits and changing coping strategies in times of need.

CHAPTER 4

Conclusions and policy recommendations



“The problems we have are getting worse each day. We have no hope for our children’s future and we just feel helpless”.

Nokwaka, 56 year old woman

4.0 Conclusions and policy recommendations

4.1 Introduction

The previous chapters have examined the relationship between HIV/AIDS and (i) the contribution of different food sources to individual and household food security (Chapter two), (ii) the consumption of wild foods and climate variability (Chapter three). The emphasis on wild foods was driven by the unsubstantiated background that HIV/AIDS and climate variability have the potential to weaken food security in rural communities hence the need to look at the interactions to understand how people cope now and may be enabled to better cope and adapt in the future.

Results from the previous chapters show that the relationship between HIV/AIDS, climate variability and food security varies significantly between sites and as do the coping strategies employed in response to shocks that affect food access. Analysis within and between sites has been carried out, but the layout and independent subjects of the chapters may make it difficult for readers to have a holistic picture of the relative contribution of wild foods to food security in the context of HIV/AIDS and climate variability, in each site. Policy makers often lament that researchers deliver disjointed information that is difficult to use (Stirzaker *et al.* 2010, Roux *et al.* 2006), therefore it is the essence of this chapter to provide a synthesis of the key results of the previous chapters into a composite picture for each site. The chapter will also look at the relevance of the study findings in the broader South African context so that policy recommendations that address food security issues at household, community and national level can be suggested.

4.2 Contextual overview of food security and wild food consumption

There were similarities and differences in the levels of food security, wild food consumption and perceptions of droughts between and within the two study sites (Table 4.1). Overall the diversity of household diets, individual diets and vegetable consumption was higher in Lesseyton than Willowvale. Quantitative data from the food and anthropometric measurements showed that respondents were adequately nourished although the qualitative data revealed that the majority of afflicted household members felt they had insufficient food at home. In Willowvale, afflicted households indicated that they respond to food shortages by borrowing food or eating food they do not like, whilst non-afflicted households indicated that they responded to food shortages by borrowing food and collecting wild foods. Thus we could conclude that afflicted households are more likely to be food insecure, but not more likely to rely on wild foods during times of food shortage. In Lesseyton however, the majority of respondents from afflicted and non-afflicted households borrowed food or skipped meals as strategies to cope with inadequate food at home.

Table 4.1. Summary of findings for each study site

Food security	Willowvale		Lesseyton	
	Afflicted	Non-Afflicted	Afflicted	Non-Afflicted
Diets	Moderately balanced	Moderately balanced	Moderately balanced	Moderately balanced
HDDS	Low	High	Low	High
IDDS	Moderate	Moderate	Moderate	Moderate
Main food source	Purchase	Purchase	Purchase	Purchase
Vegetables sources	Purchase, grown, collected from wild	Purchase, grown, collected from wild	Purchase, collected from wild	Purchase, grown, collected from wild
Fruit sources	Grown (seasonal)	Grown (seasonal)	Purchase, grown, collected from wild	Purchase, grown, collected from wild
Number of meals/day	3	3	3	3
Daily kilocalorie intake	Above recommended threshold	Above recommended threshold	Above recommended threshold	Above recommended threshold
MUAC	Well nourished	Well nourished	Well nourished	Well nourished
Proportion with adequate food at home	37 %	79 %	36 %	68 %
Strategies to limit food inadequacy	Borrowing from relatives and neighbours Eat food they do not like	Borrowing from relatives and neighbours Collect wild foods	Borrowing from relatives and neighbours Skip meals	Borrowing from relatives and neighbours Skip meals
Wild foods				
Proportions	Higher for wild fish and wild mushrooms	Higher for wild meat and wild fruits	Higher for wild leafy vegetables and wild mushrooms	Similar to afflicted households except for wild leafy vegetables and mushrooms
Gender: Male	Higher frequency of consumption for wild fish	Higher frequency of consumption for wild fish	Higher frequency of consumption for wild meat and wild fruits	Higher frequency of consumption for wild meat and wild fruits
Female	Higher frequency of consumption for wild leafy vegetables	Higher frequency of consumption for wild leafy vegetables	None	None
Selling wild foods	Wild fish	None	Wild fruits	None
Droughts				
Effects on households	Variations in effects	Similar effects on all households	Variations in effects	Similar effects on all households
Households most affected	Poor	Poor	With livestock and chronically ill members	With livestock and chronically ill members
Coping strategies for droughts	Nothing	Increase food purchases	Stop growing crops	Nothing
Drought tolerance of vegetables	Wild leafy vegetables more drought tolerant	Wild leafy vegetables more drought tolerant	Wild leafy vegetables more drought tolerant	Wild leafy vegetables more drought tolerant

The majority of respondents from afflicted households in both Willowvale and Lesseyton ate wild meat, wild birds, wild fish, wild mushrooms and wild leafy vegetables because of insufficient food at

home whilst a significant proportion of non-afflicted respondents said wild foods were nutritious. There were no respondents from afflicted or non-afflicted households who ate wild fruits because of insufficient food at home. The overall number of species consumed in each wild food type and the frequency of wild leafy vegetables and wild fruits consumption was higher in Willowvale than Lesseyton. The majority of both afflicted and non-afflicted households said wild vegetables were more drought tolerant than conventional vegetables though the number of afflicted households was significantly higher in the two study sites.

4.3 Fundamental conclusions

Having outlined the major findings for each study site, it is imperative to address the relevance of the study results in the broader South African context. In so doing, it should be borne in mind that communities are affected by a number of shocks that include HIV/AIDS, drought and poverty which affect food security at community and household level (Shackleton and Shackleton 2012, Shackleton *et al.* 2010), therefore generalising national recommendations becomes a challenge. However, from the contextual findings outlined earlier, a number of conclusions were drawn.

Food security assessments can give different results depending on the unit, method of analysis and the component of food security being assessed (IFRC 2006, Swindle and Blinisky 2006) as shown by similar variations in the quantitative and qualitative data in the two study sites. HDDS was significantly higher for non-afflicted households though their diets together with afflicted households were moderately balanced. IDDS showed no significant differences between respondents from afflicted and non-afflicted households. Afflicted households felt they were less food secure than non-afflicted households as shown by the qualitative data, though their total daily calorie intakes and MUAC were above the recommended levels. However, comparisons showed that non-afflicted households consumed significantly more food than afflicted households. Using the household as the unit of analysis, one can conclude that non-afflicted households are more food secure than afflicted households. At individual level however, one would conclude that respondents from both afflicted and non-afflicted households have similar levels of food security. The challenge then comes when targeting vulnerable households because a significant number can be left out on the pretext that they are food secure based on the results obtained from the assessments.

Afflicted and non-afflicted households can experience similar levels of food insecurity as shown by findings from this study. This suggests that in as much as HIV/AIDS and climate variability negatively affect food security, they cannot be mutually separated from other stressors that increase household vulnerability to food insecurity such as poverty (Twine and Hunter 2011, Peters *et al.* 2008). Household vulnerability is increased by the effects of shocks such as HIV/AIDS and climate variability that are exacerbated when superimposed on a situation of extreme poverty (Figure 4.1), because they create feedbacks which make the relationships complex (Shackleton and Shackleton

2012). In particular rural communities where the bulk of the food consumed by households is purchased with minimal consumption of home produced food, HIV/AIDS, climate variability and poverty work in synchrony to cause food insecurity, hence the need for a more holistic analysis.

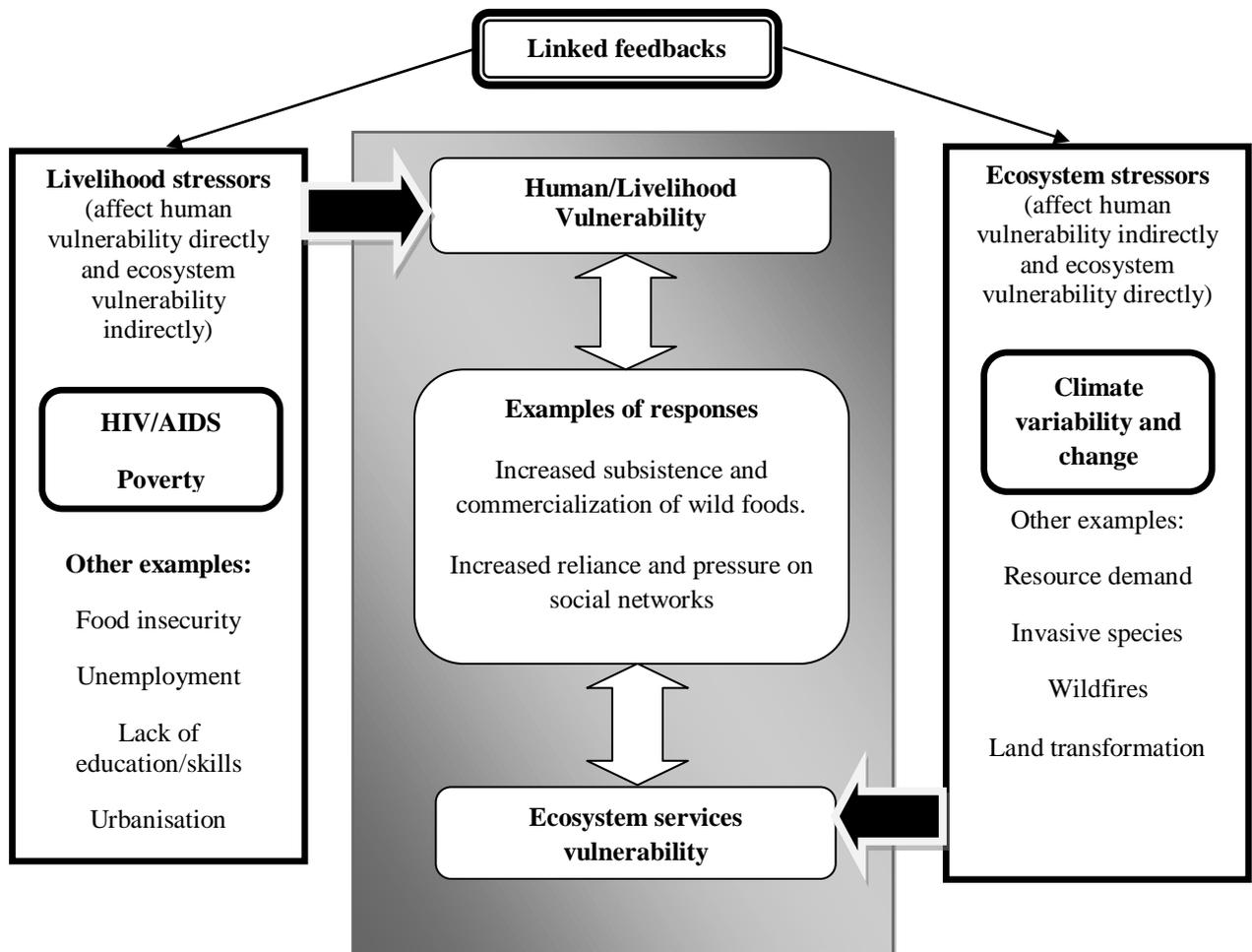


Figure 4.1. Conceptual framework showing the links and feedbacks between human/livelihood vulnerability and ecosystem services vulnerability as influenced by multiple stressors.

Source: Adapted from Shackleton and Shackleton (2012).

There is limited crop production in Willowvale and Lesseyton. The main crops grown by households are vegetables in home gardens and they are seasonal. In Willowvale, most of the fields that were previously used to grow crops have been abandoned and households now collect wild leafy vegetables from them. In Lesseyton, households only have backyard gardens which they mostly use to grow vegetables, although afflicted households did not grow any vegetables during the study period. Rural households in South Africa depend heavily on social welfare grants and remittances for food security (Kirsten *et al.* 2003) and social welfare grants provide one of the most effective means to minimize the effects of HIV/AIDS and food insecurity (Labadarios *et al.* 2011, Booysen 2004). However, when

household income decreases due to HIV/AIDS, South African households are greatly affected because of the noticeable decreases in quantities of food purchased thus compromising food security (Batchmann and Booysen 2004). This is very different from other southern African countries where rural households depend on subsistence agriculture and the negative effects of HIV/AIDS are manifested by declines in crop production which results in food insecurity (Kaschula 2011, Mason et al 2009, Yamano and Jayne 2004, SADC FANR Vulnerability Assessment Committee 2003).

Access to markets and infrastructure development in terms of road conditions, have a tremendous bearing on food access as shown by results from this study. Food access is one of the four pillars of food security and it is affected by household income, its distribution and the prices of food (Pinstrup-Andersen 2009). Households are said to have access to food when they have sufficient resources such as money to buy the right quantity and quality of food that ensures a well balanced diet (WFP 2007, IFRC 2006). Households with the same level of income but in different geographical settings can experience different levels of food security because of the inability to access food. The cost of transport and vegetables for example, was significantly higher in Willowvale than in Lesseyton because of poor road conditions and distant markets thus making it difficult for households to purchase adequate food thus compromising their food security.

Households use a range of coping strategies in response to shocks, with some being more common than others (Masanjala 2007). Some coping strategies are short term and reversible such as collecting wild foods and selling non-essential assets (IFRC 2006, WFP 2005). Others are detrimental and create food insecurity such as sale of land and ceasing crop production (IFRC 2006, WFP 2005). Evidence from this study corroborate previous work in the South African context by Kaschula (2011), Paumgarten and Shackleton (2011) and Misselhorn (2009) indicating that social capital is pivotal in ensuring household food security because the majority of afflicted and non-afflicted households cited borrowing food and kinship as a strategy they use when food supplies dwindle. However, as pointed out by Kaschula (2011) and Kidman and Heymann (2009) it should be noted that though borrowed and donated foods are important, the quantities may be small hence the overall contribution to household diets is sometimes minimal.

Wild foods are an indispensable safety net because they are accessible for households to use during hard times when conventional food sources are scarce (Arnold *et al.* 2011). The indispensable value of wild foods in household food security tends to be overlooked and in some cases, not well reported (Kaschula 2009). There is numerous data on edible species and their nutritional value, but quantitative data on the use of wild foods and their contribution to diets in terms of quantity and nutrition are limited (Shackleton *et al.* 2010). However, findings from this study clearly show that wild foods are used extensively and regularly hence they contribute immensely to individual and household food security in normal times when there are no shocks. In addition, wilds foods are a free safety net that

households use during times of crises. However, the consumption of wild foods was largely dependent on factors such as geographic location, availability, abundance, gender, season and household affliction status in both Willowvale and Lesseyton. It is worth noting that households in a certain area or socio-economic context may be more vulnerable than others due to variations in exposure to shocks and the presence of safety nets such as access to freely available wild foods (Paumgarten and Shackleton 2009, Kgathi *et al.* 2007). Overall, there were significantly more afflicted households who ate wild foods because of inadequate food at home and their free availability with some selling them to generate income. The pressure that HIV/AIDS puts on limited household resources and social networks may be increasing reliance on wild foods as the wealthier relatives and neighbours can no longer afford to assist each other (Shackleton *et al.* 2010). There is evidence across South Africa on the increase in the trade of wild foods to supplement income as households plunge into deep crisis (Twine and Hunter 2011, McGarry and Shackleton 2009, Shackleton *et al.* 2008, Shackleton and Shackleton 2005, Shackleton 2004).

Wild leafy vegetables are more drought tolerant than conventional vegetables. The majority of respondents in the two study sites alluded to this which is supported by Dweba and Mearns (2011) and Jansen van Rensburg *et al.* (2007). It again shows the critical value of wild leafy vegetables during periods of food scarcity such as droughts which may be caused by the effects of climate variability and change. The shifts in rainfall and temperature patterns caused by climate change and variability are predicted to create water shortages and negatively impact on rain fed agriculture (Nord and Luckscheiter 2011, IPCC 2007, DEAT 2006) whilst changing vegetation types and cover in arid areas (Mizuno and Yamagata 2005). The effects of climate variability and change are expected to significantly increase household dependence on locally adapted and indigenous wild foods, such as wild vegetables because they can withstand harsh climatic variations (Shackleton *et al.* 2010).

From the above conclusions, the argument can be made that rural households consume wild foods and these contribute directly and indirectly to food security. Recognising this, what can be done now that it is clear that rural households make extensive use of wild foods for their daily provisions and during times of crisis?

4.4. From here, where to next?

Food security is a broad term that encompasses access, utilisation and availability. Food access can be measured in terms of hunger experienced by household members or dietary diversity. Food utilisation can be measured using anthropometric parameters such as MUAC, height and weight. Food availability can be measured using food procurement data or household food inventory. Efforts in the past have been aimed at improving food access because even when food is available in markets, some communities and households may not be able to access it (USDA 2011). In Willowvale for example, food is available in the markets but it is not easily accessible for some households who thus

experience lower dietary diversity. Firstly, Labadarios *et al.* (2011) point out that in the past ten years food insecurity has decreased in the South Africa due to the various programmes initiated by the government, though a significant proportion of households are still food insecure. Secondly, South Africa does not have a prescribed methodology that can be used to assess all dimensions of food security (Labadarios *et al.* 2011). In light of the above, this calls for the urgent development of a suitable food security assessment methodology that researchers in South Africa can use so that efforts and resources are properly channelled to formulate policies that accurately target vulnerable communities and alleviate food insecurity.

Moderate dietary diversity in the majority of households can possibly be overcome by promotion of subsistence farming through the establishment of nutrition gardens and increased awareness of the nutritional benefits accrued from the consumption of wild foods. Nutrition gardens are particularly important in rural areas where people have poor access to markets and limited income generating options (FAO 2001) but do not have access to land, such as in Willowvale. They also have the capacity to improve household food security and alleviate micronutrient deficiencies through (i) access to diverse nutritious foods, (ii) reducing expenditure on food and generating income from sale of surplus produce and (iii) safety net during seasonal lean periods (FAO 2001). Nutrition gardens have proved to be successful in areas where they have been established such as Zimbabwe (Dever 2008, Concern 2006), Lesotho (FAO 2008b) and Asia (HKI 2010, Lannotti *et al.* 2009). In Lesseyton where there are water shortages, drip irrigation can be used to water the nutrition gardens. Drip irrigation minimises water use because it allows for targeted water application where surface run-off and watering of non-targeted areas is avoided (Toro 2008).

However, Kaschula (2011), Twine and Hunter (2011) and Misselhorn (2005) suggests that the alleviation of food security in southern Africa lies outside the sphere of agricultural production and focusing on improving crop yields would overlook economic issues such as poverty, lack of employment and inflation; and socio-political factors such as HIV/AIDS, conflict and education all of which increase vulnerability and instability in communities. Policy recommendations based on the study findings would be to improve food security by targeting vulnerable communities broadly instead of focusing entirely on households affected by HIV/AIDS. Interventions that focus on poverty alleviation can improve food security for poor non-afflicted and HIV/AIDS afflicted households. Lack of employment can be addressed by the creation of low-cost income generating projects which do not require large tracts of land such as poultry, piggery, wool and mushroom production. In Lesseyton for example, prickly pear is abundant therefore workshops can be done to train households on how to make prickly pear jam for household consumption and sale in supermarkets and vegetables shops. Households can form co-operatives that are formally registered with the Ministry of Social Services and allow them to buy inputs at subsidised prices. In the co-operatives, each individual pays a membership fee that goes towards the purchase of inputs required for the project and also encourages

commitment to the project because people tend to abuse free resources. The co-operatives need training on basic project management and marketing skills. Government and NGOs can work together with communities and facilitate access to markets for the products. These projects will not only improve food security at household level but can expand to community and provincial level.

Cattle are vital assets for rural households and they are used as an indicator of wealth in community surveys. They provide draft power, income and food in the form of meat and milk. Cattle need regular dipping to safeguard them from tick-borne diseases. The dipping facilities in Willowvale and Lesseyton are no longer functional and households have to dip cattle on their own and the majority cannot afford to buy the chemicals needed. Before 1996, the Eastern Cape Provincial Department of Agriculture was responsible for the supply of chemicals and personnel for dipping services (Masika *et al.* 1997). These services were stopped because of budget constraints (Masika *et al.* 1997). The government needs to resuscitate veterinary and dipping services in the province so that households can grow their herds of cattle which will in turn reduce poverty and improve food security.

4.5 Future Research

In Africa, rural households affected by HIV/AIDS tend to experience food insecurity due to significant decreases in crop yields caused by household labour deficits and inability to purchase inputs. In this study however, the bulk of food consumed by afflicted and non-afflicted households was purchased which is similar to other studies done in South Africa (e.g. Kaschula 2011, Kaschula 2008, Yamano and Jayne 2004, SADC FANR Vulnerability Assessment Committee 2003). There was also a significant contribution from wild leafy vegetables and wild fruits to household dietary intake. Considering the importance of purchased food and wild foods to household food security in rural areas, there is need for longitudinal in-depth studies that focus on household income and food expenditure changes over time and wild food consumption in both afflicted and non-afflicted households so that the effects of HIV/AIDS, climate change and variability on household food security and wild food consumption can be accurately ascertained. In addition, programmes aimed at domesticating the production of wild leafy vegetables and wild fruits can also be initiated so that households increase their consumption of wild foods, reduce expenditure on food and generate additional income from the sale of wild fruits.

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APPENDICES

APPENDIX A: Annual household survey 1 (A1)

Household code _____

Control information

Task	Date(s)	By who?	Status OK? If not, give comments
Interview			
Checking questionnaire			
Coding questionnaire			
Entering data			
Checking & approving data entry			

Household Selection

1. Map page & generated grid number	
2. North-most household interviewed? Y/N If yes move to 5.	
3. If 'no': Reason for not interviewing North-most household?	1. No houses in grid block (go to nearest house) 2. Refused to be interviewed – too busy 3. Refused to be interviewed – other 4. Never at home 5. Premises empty 6. Deaf/foreign language 7. Other - specify
4. Final grid number of household interviewed	
5. Is interviewed hh neatly marked on map? Y/N	

Starting time _____ **Finishing time** _____

A. Identification

1. Household name & code (Map page & grid no.)	*(name)	(HID)
2. Village name and code	*(name)	(VID)
3. Name and PID (see B. below) of primary respondent	*(name)	(PID)
4. Name and PID (see B. below) of secondary respondent	*(name)	(PID)
5. GPS reference point of household (UTM format)		

B. HOUSEHOLD COMPOSITION AND HUMAN CAPITAL

1. Please give the details of anyone living in the household, and anyone in the household who passed away in the past ten years.

1. Personal Identification number (PID)	* Name of household member	2. Relation to household head ¹⁾	3. Year born (yyyy)	4. Sex 0=male 1=female	5. If deceased: What year did s/he pass away?
1	Include surname of household head	Household head = code 0			
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

1) Codes: spouse (legally married or cohabiting)=1; son/daughter=2; son/daughter in law=3; grandchild=4; mother/father=5; mother/father in law=6; brother or sister=7; brother/sister in law=8; uncle/aunt=9; nephew/niece=10; step/foster child=11; other family=12; not related (e.g., friend)=13.

Yes	No
-----	----

1.b. Are there other households living on this property?

1.c. If yes, how many other people, aside from those in your household, are living on this property? _____

2. Please could you provide more details about the employment status and skills of everyone that has just been recorded in the previous table as part of the household (anyone living in the household and anyone who has passed away in the past ten years):

1. Name/PID	2. <i>Employment status¹⁾</i> <i>(Can have more than one, list in order of importance)</i>	3. Level of education ²⁾	4. Other formal or informal training or skills. <i>(Probe – employment or self-employment skills, eg. Welding, nursing, artisan, etc.)</i>	5. What languages can this person speak, other than Xhosa? List all responses None = 0 English = 1 Afrikaans = 2 Other = 3
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

CODES: 1) Employed full-time = 1; employed part-time = 2; self-employed (farmers in this category) = 3; unemployed = 4; in school or some form of training (apprentice, course) = 5; retired = 6; doesn't work or go to school (e.g. disabled, too young) = 7;

2) Illiterate = 1, literate without formal schooling = 2, literate: below primary = 3, primary = 4, middle secondary (grade 9) = 5, secondary (matric) = 6, diploma/course with certificate = 7, graduate = 8, post-graduate = 9.

Please take a moment to remember life in this household ten years ago – when Mandela's presidency came to an end and Mbeki became president and we entered the New Millennium

3. Overall, is the household able to do more, less or the same amount of work (formal or around

Less	The same	More
------	----------	------

the homestead) compared to ten years ago?

3.b. If more or less, why the change?

C. SOCIAL CAPITAL

1. a. How long ago was this household first established in the village?

< 2 years 1	2 - 6 years 2	6 – 10 years 3	11 – 20 years 4	21 – 50 years 5	51 – 100 years 6	>100 years 7
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1.b. If less than ten years, why did the household move?

2.a . Do household members participate in any groups in the community? If yes, ask details of the group/organisation. If more than one person from the household is a member of the same group, record all of their names.

1. Type of group	2. Name of group	3. Who in the household is part of this group? List names	4. How many hours a week/month does household member participate?	5. Is household member part of a committee for the group? Y/N (List name/s if yes)	6. Has the household ever received any cash benefits from the group? Y/N	7. Has the household ever received any other type of support from the group? Y/N
Church						
Savings						
Farming						
Volunteer						
Sports/ dance/ music						
Health, care or support						
Women's group						
School group						
Lobbying						
Development/ income generating						
Other (specify)						

Other (specify)						
-----------------	--	--	--	--	--	--

3. Does anyone in the household know anyone who could advise you/them on the issues below without charging? This can be formal (e.g. an organisation) or informal (e.g. a friend). If not, do you feel that the household would benefit from knowing where to get advice on these issues?

Area of expertise	Is free advice available to household? Y/N	If no, would it benefit? Y/N	Area of expertise	Is free advice available to household? Y/N	If no, would it benefit? Y/N
Human rights			Building/construction		
Legal advice			Schooling		
Medical advice			Relocate/ move elsewhere		
Veterinary advice			Market and self-employment		
Crop farming advice			Credit and financial advice		

4. How strongly do you agree or disagree with the following statements?

4.1 a. People around here are willing to help their neighbours

1. Strongly disagree	2. Disagree	3. Agree	4. Strongly Agree
----------------------	-------------	----------	-------------------

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

1. Strongly disagree	2. Disagree	3. Agree	4. Strongly Agree
----------------------	-------------	----------	-------------------

4.1 c. If I had to borrow R50 in an emergency, I could borrow it from a neighbour.

1. Strongly disagree	2. Disagree	3. Agree	4. Strongly Agree
----------------------	-------------	----------	-------------------

4.1 d. People in this neighbourhood generally get along with each other

1. Strongly disagree	2. Disagree	3. Agree	4. Strongly Agree
----------------------	-------------	----------	-------------------

4.1 e. People in this neighbourhood CAN be trusted

1. Strongly disagree	2. Disagree	3. Agree	4. Strongly Agree
----------------------	-------------	----------	-------------------

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

1. Strongly disagree	2. Disagree	3. Agree	4. Strongly Agree
----------------------	-------------	----------	-------------------

4.1 g. People in this neighbourhood share the same beliefs, culture and values

1. Strongly disagree	2. Disagree	3. Agree	4. Strongly Agree
----------------------	-------------	----------	-------------------

5. Does this household, or anyone in the household, take part in community decision making (in ward meetings, community meetings, etc.)?

No / never 1	Sometimes 2	Yes / often 3
-------------------------------	------------------------------	--------------------------------

Please take another moment to remember life in this household ten years ago/ when you first moved here – when Mandela’s presidency came to an end and Mbeki became president and we entered the New Millennium

6. Overall, is the household’s current involvement in community groups, events and meetings more, less or the same amount compared to ten years ago OR when you first moved here? (circle appropriate)

Less	The same	More
-------------	-----------------	-------------

6.b. If more or less, why the change?

D. PHYSICAL CAPITAL AND SERVICES

1. Please indicate the type of main house you have?

1. Number of buildings	
2. <i>Enumerator:</i> What is the approx. area of the main building?	M ²
3. What are the walls of the main building mostly made of? ¹⁾	
4. What is the roof of the main building mostly made of? ²⁾	

1) Codes: mud/soil=1; wooden (boards, trunks)=2; iron (or other metal) sheets=3; bricks or concrete=4; reeds/straw/grass/fibers/bamboo=5; other, specify :

2) Codes: thatch=1; wooden (boards)=2; iron or other metal sheets=3; tiles=4; other, specify:

2. Do you have a kraal?

Yes	No
------------	-----------

3. Please indicate the number of implements and other large household items that are owned by the household. Please estimate the current value of these items.

	1. Number of units owned	2. Total value (current sales value of all units, not purchasing price)
1. Car/truck		
2. Tractor		
3. Motorcycle		
4. Bicycle		
5. Cellphone/phone		
6. TV		
7. Radio		
8. Cassette/CD/ VHS/VCD/DVD/ player		
9. Stove for cooking (gas or electric only)		
10. Refrigerator/freezer		
11. Chainsaw		
12. Plough		
13. Trailer		
14. Shotgun/rifle		
16. Wooden cart or sledge		
17. Bed/s		
18. Water pump		
19. Solar panel		
20. Sewing machine		
21. Jo-jo tank		
22. Geyser		
23. Wheelbarrow		
24. Generator		

99. Others (worth more than approx. R500 purchasing price)		
Other		

4.a. Do you have electricity?

Yes	No
-----	----

4.b Do you receive free basic electricity?

Yes	No
-----	----

4. c. How much do you spend on electricity each month? R _____

Please take another moment to remember life in this household ten years ago/ when you first moved here – when Mandela’s presidency came to an end and Mbeki became president and we entered the New Millennium

5. Overall, has the infrastructure on and around the household’s homestead improved,

Improved	The same	Worsened
----------	----------	----------

worsened or stayed the same compared to ten years ago OR when you first moved here? (circle appropriate)

5.b. If improved or worsened, why the change?

6.a. Where does the household get most of its water from? ¹⁾	
6.b. Is this source ever inadequate for all of the household’s need? Y/N	
6.c. Does the household have access to alternative sources of water? If so, what are they? ¹⁾	
6.d. Has there ever not been enough water at all? Y/N	

(CODES: 1) rainwater tank provided by govt=1; rainwater tank owned/purchased by household=2; tap on property=3; community taps=4; borehole=5; reservoir=6; dam=7; river=8; truck = 9; bought=10, other = specify

Yes	No
-----	----

8. a. Does the household recycle/ re-use any

water?

8. b. If yes, from which activity/activities is water re-used/recycled, and how is it re-used/recycled?

E. NATURAL CAPITAL

1. Do you have a garden or fields for growing or grazing? If yes, how large is the area and do you use it?

	1. Area (RECORD UNIT - meter, hectare, etc) <i>Measure if unknown</i>	2. Is it fenced? Y/N	3. Is it used? Yes, no or partly	4. If any part is not used, why is it not used?	5. If partly used, approx. how much (1/2, 1/4, etc.) is used?
1. Garden on homestead					
2. Fields for cultivation					
3. Community grazing land					
4. Grazing land belonging to household					

2. Does the household use the following? If it is not used by the household, is there anything preventing the household from using the resource if they did want to use it, and would the household ever use it?

	1. Is it used by the household? Y/N	2. If not used, is there anything preventing the household from using the resource if they wanted to? Explain if yes.	3. If not used, is there ever a situation where you might use it? Y/N
1. River or dam for freshwater fishing, recreation or cultural activities			
2. Community garden			
3. Grazing land			
4. Forests and trees			
5. Wildlife/bushmeat			
6. Wild fruit and vegetables			

7. Medicinal plants			
8. <i>Willowvale only</i> : Marine products (fish, mussels..)			

Please take another moment to remember life in this household ten years ago/ when you first moved here – when Mandela’s presidency came to an end and Mbeki became president and we entered the New Millennium

3.a. Overall, does the household currently use more, less or the same amount of the natural resources mentioned in the two previous questions compared to ten years ago OR when you first moved here? (*circle appropriate*)

Less	The same	More
------	----------	------

3.b. If more or less, why the change?

4.a. Has the quality of agricultural land (grazing land, soil fertility) worsened or stayed the same compared to ten years ago OR when you first moved here? (*circle appropriate*)

Worsened	The same	Improved
----------	----------	----------

4.b. If it has improved or worsened, why the change?

F. FINANCIAL CAPITAL

1.a. How much does the household have in savings? (in banks, credit associations, savings clubs or any other place)

R_____

1. b. Is the household saving for anything specific? If yes, what specifically?

1.c. Is the household currently saving more, less or the same amount compared to ten years ago?

Less	The same	More
------	----------	------

2. a. Do you owe money to anyone? To who, and how much is owed? Can have more than one

Don't owe money	Local money-lender	Bank or formal credit institution	Neighbour or friend	Family	Savings club	Loan sharks	Hire purchase (furniture, appliances, etc.)	Other (specify)
R	R	R	R	R	R	R	R	R
								TOTAL R

3.a. Could the household access credit for a farming or self-employment venture if it needed to?

Yes	Don't know	No
-----	------------	----

3.b. If yes, where from?

3.c. Has anyone in the household accessed credit in the last ten years?

Yes	No
-----	----

Please take another moment to remember life in this household ten years ago – when Mandela's presidency came to an end and Mbeki became president and we entered the New Millennium

4.a. Is it currently easier, harder or the same to meet all the household's needs each month compared to ten years ago ?

Easier	The same	Harder
--------	----------	--------

4.b. If easier or harder, why the change?

G. RESPONSES TO SHOCKS:

1. In the past 12 months, has the household faced any of the following shocks? If so, how severe was the shock and how did the household cope with this shock?

Event	1. Y/N ?	2. How severe? 0 = no crisis 1 = yes, moderate crisis 2 = yes, severe crisis	3. How did you cope with the income loss or costs? Tick column/s ¹⁾											
			1. Harvest more	2. Changed farming	3. Spent savings	4. Sold Assets	5. Extra work	6. Friend Assist	7. Org. Assist	8. Loan	9. Reduce consump	10. Rented out	11. Did Nothing	12. Other, specify
1. Serious crop failure														
2. Serious illness in family (productive age-group adult unable to work for more than one month during past 12 months, due to illness, or to taking care of ill person; or high medical costs)														
3. Death of productive age-group adult														
4. Land loss (expropriation, etc.)														
5. Major livestock loss (theft, drought, etc.)														
6. Other major asset loss (fire, theft, flood, etc.)														
7. Lost wage employment														
8. Initiation, wedding or other costly social events														
9. Payment for sale of hh products arrive later than expected														
10. Other, specify:														

1) Codes coping:

1. Harvest more natural/wild products or agricultural products
2. Changed farming/agricultural techniques
3. Spend cash savings or retirement money
4. Sell assets (land, livestock, etc.)

5. Do extra casual labour work/self-employment initiative
6. Assistance from friends and relatives
7. Assistance from NGO, community org., religious org. or similar
8. Get loan from money lender, credit association, bank etc.

9. Tried to reduce household consumption (food and/or goods)
10. Rented out land or rooms
11. Did nothing in particular
12. Other, specify:

H. HEALTH

1. Please could you provide more details about the health of everyone that has just been recorded in the previous table as part of the household (anyone living in the household and anyone who has passed away in the past ten years):

1. Name/PID	2. For under 19's only (born after 1992): Where are his/her parents? ¹⁾	3.a. Health status ²⁾	3.b. If deceased: Was he or she chronically sick or sick for 3 or more months before he/she passed away? Y/N	If chronically ill (4 or 6 in 3.a.):	
				3.c. Is he/she receiving care or treatment from a clinic?	3.d. If yes, is the care or treatment free?
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14.					

CODES: 1) Alive, both living in house=1; alive, but both away=2; mother in house, father away=3; mother in house, father deceased=4; father in house, mother away=5; father in house, mother deceased=6; both parents deceased=7.

2) Excellent health = 1; occasional illness = 2; frequent illness = 3; chronic/long term illness (over three continuous months) = 4; disabled = 5; both chronic illness and disabled = 6; deceased = 7.

I. Welfare perceptions

1. All things considered, how satisfied are you with your life over the past 12 months? <i>Codes: 1=very unsatisfied; 2=unsatisfied; 3=neither unsatisfied or satisfied; 4=satisfied; 5=very satisfied</i>	
2. Do you feel the household's situation is better, worse or about the same today than it was ten years ago? <i>Codes: 1=worse off now; 2=about the same; 3=better-off now</i>	
3. If worse or better off, what caused this change?	
5. Do you consider your village (community) to be a good place to live? <i>Codes: 1=no; 2=partly; 3=yes</i>	
6. Has the household's food production and income over the past 12 months been sufficient to cover what you consider to be the needs of the household? <i>Codes: 1=no; 2=reasonable (just about sufficient); 3=yes</i>	
7. Compared with other households in the village (or community), how well-off is your household? <i>Codes: 1=worse-off; 2=about average; 3=better-off</i>	

F: Climate change perceptions

1. Compared to ten years ago OR when you first moved here? (circle appropriate), have the following extreme events become more or less severe? Tick

Event type	More severe	Same	Less severe
Storms			
Droughts			
Veld fires			
Floods			
Heat waves			
Cold snaps			
<i>Willowvale: Snow</i>			
<i>Lesseyton: Frost</i>			

1. How would you rate the weather's impact on the following aspects of the household? Tick columns

Impact	High impact	Moderate impact	Low impact	No impact
Ability of crops to survive				
Ability of livestock to survive				
Abundance of useful plant and animal species in the area				
Availability of water for the livestock and crops				
Availability of water for the household				
Food security				
Human health				
Damage caused by extreme events				

J. HIV/Aids perceptions

1. How would you rate the impact of HIV/Aids on the following aspects in this community, and has this impact resulted in an increase or decrease of these aspects?

Impact	Inc or dec?	High impact	Moderate impact	Low impact	No impact
Willingness of neighbours to help each other					
Trust					
Food security (people's ability to get enough food every day)					
Labour to undertake activities					
Remittances					
Migrancy					

2. What do you think is needed the most by households living with HIV or Aids?

—

ENUMERATOR ASSESSMENT

1. Based on your impression, how content/happy would you say the respondent is on a scale of 1 to 10 (with 1 being not content at all and 10 being very content)	
2. Based on your impression and what you have seen (house, assets, etc.), how well-off do you consider this household to be compared with other households in the village? Worse-off = 1; About average = 2; better off = 3	
3. How reliable is the information generally provided by this household? Poor = 1; reasonably reliable = 2; very reliable = 3	

Appendix B: Dietary recall and Wild foods Questionnaire

Household respondent number:

Respondent reference number:

Interviewer:

Date:

Village:

Household vulnerability score: [1] [2] [3] [4] [5] [6]

Section 1: Reference Information

1.1 Name of Respondent:

1.2 Gender: Male Female

1.3 Age:

1.4 Highest standard passed:

1.5 Mid-upper arm circumference:

Section 2: 48 Hour diet recall

Yesterday			SOURCE				
Meals	Food and Drink	Quantity	Bought	Donated	Grown	Gathered	Where
Breakfast							
Snack							
Lunch							
Snack							
Supper							
Snack							

Day before yesterday

Meals	Food and Drink	Quantity	Bought	Donated	Grown	Gathered	Where
Breakfast							
Snack							
Lunch							
Snack							
Supper							
Snack							

Appendix C: Food Security Questionnaire

To be administered in the third quarter.

1. How many meals do you normally have per day? **a) 1 b) 2 c) 3 d)4 e)5**

2. Are the number of meals usually the same throughout the year? **Yes No**

If no, why?

3. Do you have snacks in-between meals?

a) Always b) Usually c) Sometimes d) Rarely e) Never

4. Do you feel you have enough to eat at home? **Yes No**

Why?

5. When last do you remember not having enough to eat?

a) Today or yesterday b) Few days ago c) More than 2 weeks ago

d) More than a month ago e) A few months ago f) A year ago g) Never

6. When you do not have enough to eat at home, what do you normally do?

a) Go all day without eating b) Collect wild foods

c) Skip meals d) Serve smaller portions

e) Eat food you do not like f) Borrow food or go to relatives or friends

g) Other – specify

7. Is there a particular order for eating after a meal is prepared? **Yes No**

If there is, who eats first?

a) Youngest b) Girls c) Boys d) Grandfather
e) Grandmother

f) Father g) Mother h) Children i) all

8. Has your diet always been like this? Yes No

If no, why?

9. Are there times during the month when you typically eat more food than usual?

Yes No

If yes, why?

10. Are there times during the month when you typically eat less food than usual?

Yes No

If yes, why?

11. Are there times during the month when you typically eat different types of food than usual?

Yes No

If yes, why?

12. When you think about the **AMOUNT** of food you eat, where does most of it come from?

a) Grown b) Wild c) Bought d) Donated/Gifts

13. When you think about the **DIFFERENT TYPES** of food that you eat, where do most **TYPES** come from?

- a) Grown b) Wild c) Bought d) Donated/Gifts**

15. When you think about the foods you **LIKE THE MOST**, where do most of them come from?

- a) Grown b) Wild c) Bought d) Donated/Gifts**

16. Are there some households in the community who are frequently hungry?

- Yes No Don't know**

Why are these household frequently hungry?

17. Further Notes (*interesting things that the respondent has mentioned*)

Appendix D: Wild Foods Questionnaire

1. Did you eat wild animals in the last 3 months? Yes No

If yes, which ones?

How often?

If no, when did you last eat wild animals? **a) six months ago b) a year ago c) more**

than a year ago d) never e) when I was a child

Why do you hunt wild animals? **Circle all responses given**

- | | |
|--|-----------------------------|
| a) There is insufficient food at home | b) I like wild foods |
| c) I want to sell it | d) I follow others |
| e) My parents send me | f) They are healthy |
| g) For cultural purposes | h) They are free |

How many hours do you take hunting?

2. Did you eat wild caught fish in the last 3 months? Yes No

If yes, which ones?

How often?

If no, when did you last eat wild caught fish? **a) six months ago b) a year ago**
c) more than a year ago d) never e) when I was a child

Why do you fish? **Circle all responses given**

- | | |
|--|-----------------------------|
| a) There is insufficient food at home | b) I like wild foods |
| c) I want to sell it | d) I follow others |
| e) My parents send me | f) They are healthy |

g)For cultural purposes

g) They are free

How many hours do you take fishing?

3. Did you eat birds in the last 3 months? **Yes** **No**

If yes, which ones?

How often?

If no, when did you last eat birds? **a) six months ago** **b) a year ago** **c) more than a year ago** **d) never** **e) when I was a child**

Why do you hunt birds? **Circle all responses given**

a)There is insufficient food at home

b)I like wild foods

c)I want to sell it

d)I follow others

e)My parents send me

f) They are healthy

g)For cultural purposes

g) They are free

How many hours do you take shooting birds?

4. Did you eat wild leafy vegetables in the last 3 months? **Yes** **No**

If yes, which ones?

How often?

If no, when did you last eat wild leafy vegetables? **a) six months ago** **b) a year ago** **c) more than a year ago** **d) never** **e) when I was a child**

d) never **e) when I was a child**

Why do you collect wild vegetables? **Circle all responses given**

a)There is insufficient food at home

b)I like wild foods

c)I want to sell it

d)I follow others

e)My parents send me

f) They are healthy

g)For cultural purposes

h) They are free

How many hours do you take collecting wild vegetables?

5. Did you eat mushrooms in the last 3 months? **Yes** **No**

How often?

If no, when did you last eat mushrooms? **a) six months ago** **b) a year ago** **c) more**

than a year ago **d) never** **e) when I was a child**

Why do you collect mushrooms? **Circle all responses given**

a)There is insufficient food at home

b)I like wild foods

c)I want to sell it

d)I follow others

e)My parents send me

f) They are healthy

g)For cultural purposes

h) They are free

How many hours do you take collecting mushrooms?

6. Did you eat wild fruits in the last 3 months? **Yes** **No**

If yes, which ones?

How often?

If no, when did you last eat wild fruits? **a) six months ago** **b) a year ago** **c) more**

than a year ago **d) never** **e) when I was a child**

Why do you collect wild fruits? **Circle all responses given**

a)There is insufficient food at home

b)I like wild foods

c)I want to sell it

d)I follow others

e)My parents send me

f) They are healthy

g)For cultural purposes

h) They are free

How many hours do you take collecting wild fruits?

8. Do some households eat wild foods more than the others? **Yes** **No**

Don't know

9. Why do they eat more wild foods than the others?

10. When do they eat more wild foods than the others?

11. Which wild foods do they eat more than others?

12. Do you eat as much wild foods as your parents?

Yes

No

Don't know

Why?

Appendix E: Climate Variability Questionnaire

To be administered in the second quarter to the household head.

1. When was the last drought that affected more the 50 % of your crops or livestock?

2. How did you cope?

3. Does drought affect some households more than the others?

Yes **No** **Don't know**

If yes, why?

How does drought affect these households?

4. Has there been any change in your crop harvests in the last 5 years?

Yes **No** **Don't know?**

Why?

5. Do you think wild vegetables have more, less or the same drought tolerance to conventional vegetables such as spinach and cabbage?

Yes **No** **Don't know**

Why?