ANALYSING THE CAUSES AND SYMPTOMS OF POVERTY IN A LAND REFORM COMMUNITY IN THE MIDLANDS OF KWAZULU-NATAL

by

LAUREN HAZEL SHINNS

Submitted in fulfilment of the academic
requirements for the degree of
Master in Agricultural Management in the
School of Agricultural Sciences and Agribusiness
Faculty of Science and Agriculture
University of KwaZulu-Natal

Pietermaritzburg
2004

ABSTRACT

The objectives of this thesis were firstly, to review existing literature in order to identify broadly accepted and measurable indicators of the possible causes of poverty and the resulting symptoms. Secondly, to gather baseline information from a group of land reform beneficiaries in order to identify the different dimensions of poverty affecting the current and future well-being of these households. Thirdly, to undertake empirical analysis to assign these households to a small number of groups exhibiting different symptoms of poverty and then explain these differences in terms of their possible causes.

A census survey of 38 land reform beneficiary households – members of a Communal Property Association (CPA) established to purchase Clipstone, a 630 hectare subdivision of the farm Sherwood in the midlands of KwaZulu-Natal - was conducted in May 2002 to gather data on poverty indicators. Principal Component Analysis was used to construct an index of the standard of housing, which was then combined with variables measuring other symptoms of poverty (income, wealth and health) in a Cluster Analysis of the households. This revealed five clusters representing four distinct groups of poverty; households relatively income and asset rich, income rich but asset poor, asset rich but income poor and households with the lowest incomes and assets. Linear Discriminant Analysis was then used to distinguish the households that were relatively income and asset "rich" from those that were relatively income and asset poor, and those that were relatively income poor but "asset rich" from those relatively asset poor but "income rich".

The main distinguishing indicators were found to be gender of the household head, family size, dependency ratio, education and access to markets. These findings show that there is a need to increase child welfare grants as pension earnings become less effective (due to

decreasing life expectancy and high levels of dependence on pensions as a source of income) in the short run. In the long run, there is a need for increased education and vocational training – especially for women along with better access to transport, jobs and banking facilities (to mobilise savings).

DECLARATION

I herby certify, that unless specifically indicated to the contrary in the text, this dissertation is the result of my own original work and has not been submitted for a degree at any other University.

Signature  Date 18/08/05

Lauren Shinns

I hereby certify that this statement is correct.

Signature  Date 18/03/05

Supervisor

ACKNOWLEDGEMENTS

This publication was made possible by support provided in part by the US Agency for International Development (USAID) Agreement No. LAG-A-00-96-960016-00 through the Broadening Access and Strengthening Input Market Systems Collaborative Research Support Program (BASIS CRSP). All views, interpretations, recommendations and conclusions expressed in this paper are those of the authors and not necessarily those of the supporting or co-operating organisations.

I would like to thank my Supervisor Professor M. Lyne for all the help and encouragement over the last three years. The completion of this thesis would have been impossible without his never ending patience, input, advice and e-mailing.

Perfect as the wing of a bird may be, it will never enable the bird to fly if unsupported by the air (Ivan Pavlov:1849 – 1936). I would like to thank my parents for being my air – without their unwavering love and support I would never have come so far, achieved so much or become the person I am today.

Debbie for always being the protective, caring, big sister any little girl would look up to with a sense of awe and pride, pushing me to be the best that I could be.

Antony Hinds for both his unusual urge to have an opportunity to wear a suit to my graduation and for always wanting the best for me in every possible way.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

The concept of economic poverty can be briefly defined as the inability to attain the goods and services considered essential to human well being. Although poverty is a worldwide phenomenon, the situation in South Africa is fairly unique in that colonialism and apartheid shaped the present poverty and opportunity configurations along racial lines. Disadvantaged groups in South Africa have been left with fewer resources, including land, lower levels of education, and spatially divided households due to the need for external incomes (Aliber, 2001).

The research undertaken in this study forms part of a longer-term study to analyse and monitor poverty amongst a community of land reform beneficiaries in the Midlands of KwaZulu-Natal. More specifically, this study investigates relationships between long-term causes of poverty (such as low levels of human capital) and their symptoms (such as low levels of income and economic wealth). The study community had been awarded Settlement/Land Acquisition Grants (SLAG) by the Department of Land Affairs in 2002 enabling them to purchase Clipstone, a 630-hectare subdivision of the farm Sherwood. Only the poorest of the poor with monthly household income below R1,500 qualify for SLAG (Department of Land Affairs, 2001). In essence, the broader study sets out to:

1 Review literature in order to identify broadly accepted and measurable indicators of poverty and its causes.

2 Gather baseline information, including observations on poverty indicators, from households in the target community.

3 Assign households to two or more groups representing different levels and

types of poverty, where poverty is measured in terms of several poverty indicators and cluster analysis is used to construct the groups.

4 Compare group sizes and household characteristics across groups.

5 Identify and rank the determinants of poverty by regressing group membership on variables thought to explain poverty.

6 To repeat steps 2-5, at intervals over time in order to monitor changes in the symptoms and distribution of poverty (i.e. shifts in group membership) and in the relative importance of variables thought to explain poverty. These changes will provide some information about the impact of the land reform project on the welfare of its beneficiary community.

This study focuses on steps 1-5 of the broader study, i.e. it gathers and analyses baseline information to quantify relative levels of poverty within the target community. The study is important as poverty alleviation is one of the stated goals of land reform in South Africa, and the effectiveness of certain models of land redistribution has been questioned (Hall *et al,* 2001: 12) .

This dissertation begins with a review of relevant literature (Chapter 1) and of implied measures of poverty (Chapter 2). Chapter 3 describes the data gathered and the empirical techniques for the proposed analysis. Chapter 4 applies these techniques to identify the symptoms and causes of poverty found in the study area. Apart from informing policy recommendations aimed at alleviating rural poverty in South Africa, the conclusions drawn also demonstrate the effects of alternative welfare programmes on households displaying different symptoms of poverty and provide the baseline information needed to monitor changes in the level and distribution of poverty within the beneficiary community over

time.

CHAPTER 1
THE DIMENSIONS OF POVERTY

1.1 DEFINING POVERTY

Poverty can be defined as the inability to attain a minimal standard of living, measured in terms of basic needs or the income required to satisfy them (Ardington, 1980). However, this definition is ambiguous as there is no universal agreement on what basic needs are. Frequent and widespread use of the concept has nevertheless popularized it into a yardstick by which lifestyles may be assessed and compared within and between communities. Basic needs are usually defined to include certain minimum requirements of a family for private consumption, e.g. nutrition (this is often the dominant item in developing countries), clothing, fuel, housing, essential services such as clean water, sanitation, education, health and transport, and income or material standard of living and leisure (Ardington, 1988; Ghai *et al*, 1977).

The general perception of poverty therefore includes material deprivation at the core, with low income and consumption levels resulting in food insecurity and malnutrition, unsafe and inefficient forms of energy and sanitation, and crowded homes that add to the problem of poor health (May, 1998; White and Killick, 2001: 10). Alienation from the community, insecure employment and fragmentation of the family unit are also considered as elements of poverty by some researchers. Poverty is not a static condition and individuals, households or communities may be vulnerable to poverty as a result of shocks and crises (uncontrollable events that harm livelihoods) or long-term trends (racial and gender discrimination, environmental degradation or macroeconomic trends). This insecurity is aggravated by an inability to make provision for emergencies (May, 1998; White and

Killick, 2001: 10).

1.2 THE NATURE OF POVERTY INDICATORS

When measuring levels of poverty it is useful to distinguish between the causes and symptoms of poverty, and not to simply group them as elements of poverty. The reasons for separating the two become obvious when trying to formulate and implement policies to reduce poverty – it is the treatment of the root causes and not the symptoms of poverty that will ultimately lead to reductions in poverty in the long run. Treatment of the symptoms is however necessary to improve living conditions in the shortrun.

The symptoms of poverty can be summarised as:

- Low levels of income. Woolard (2002) reports that eight million of the 42 million people living in South Africa were surviving on less than $1 per day, and 18 million were living on less than $2 per day, in 2002.

- Low levels of economic wealth. Economic wealth derives from assets that can generate income, capital gains or liquidity when strapped for cash. Assets like oxen play an insurance role in the event of adverse shocks (such as drought or the loss of a wage worker or pensioner) helping to smooth consumption in areas where households do not have access to efficient insurance and credit markets (Little, 2002). Studies in rural Ethiopia show that after the debilitating effects of drought, households deplete their livestock herds and consume their seed stocks (asset de-accumulation) to postpone malnutrition and disease (Little, 2001).

- Low levels of health. High levels of morbidity and infant mortality are often the

result of poor nutrition and inadequate health care. In South Africa, AIDS has compounded these problems. It is projected that the AIDS death toll will top 5.5 million by 2011 (Development Resources Centre, 2001). In 2001, South Africa's infant mortality rate was more than ten times higher than the rate in high income countries, and average life expectancy had fallen to 47 from 61 years in 1998 (South African Data Profile, 2002).

- Poor standards of housing. Inadequate housing in urban townships and rural settlements has reached crisis proportions in South Africa, with some seven million people estimated to be living as squatters (Brew, 2002). However, it is not only the type of dwelling (formal versus informal) that is important, but also the density of occupation, what the dwelling is constructed of, and whether or not sanitation is hygienic and water is safe to drink (May *et al*, 1995). In 1999, only 47 percent of the poor in South Africa had access to reticulated water and 38 percent to adequate sanitation (Woolard, 2002).

The main causes of poverty appear to be associated with:

- Location. This problem manifests in poor natural resources and high transaction costs in remote areas where physical infrastructure and services are inadequate (White and Killick, 2001:12).

- Proneness to income shocks. Income shocks are more frequent and severe where people have poor access to health care and rely on agriculture for livelihoods (White and Killick, 2001: 12). Farming is particularly vulnerable to natural disasters such as drought, floods, pests and disease.

- Institutional failures. Insecure property rights and weak enforcement systems raise transaction costs and reduce both the incentive and ability to use assets properly (White and Killick, 2001:12).

- Gender discrimination. Unskilled women usually earn lower incomes than do unskilled men who have greater physical strength for manual work (White and Killick, 2001: 13), and often face higher transaction costs in credit and other markets due to their lower social standing (Berry, 1993: 12). This leads to lower earning capacities for households with a high proportion of females, and reduced opportunities for female-headed households.

- Human capital. Unemployment levels are high amongst people who lack education (Woolard, 2002). In South Africa almost 60 percent of adults with no formal education are poor. The incidence of poor people is 15 percent amongst matriculants, and just five percent amongst those with tertiary education (Woolard, 2002). Gender discrimination is also evident in education. A recent study of 41 counties shows that parents who cannot afford to enrol all of their children for school tend to enrol males ahead of females (World Development Report 2000/2001).

- Social capital. This incorporates concepts such as "trust", "community" and "networks" that indicate faith in safety-nets provided by family, community and government, sometimes approximated by measures of trust in government, voting trends, participation in civic organisations, donations and voluntary work. In a large-scale survey of social capital in Tanzania, Narayan and Pritchett (1997)

found that village-level social capital raised household incomes.

The distinction between causes and symptoms is not always clear-cut. For example, poor health can impair the ability to learn and to work, and low levels of education may be caused by low levels of income (White and Killick, 2001: 28). Treating the "symptoms" of poverty may therefore go beyond short-run improvement in living conditions.

Indeed, both the causes and symptoms of poverty are involved in understanding the "entitlements" that help to explain the general nature of poverty (Sen, 1981: 4). The entitlement approach to poverty concentrates on the ability of people to command food through the legal use of production possibilities, trade opportunities and other entitlements (e.g. welfare payments). Simply put, the current nature of poverty a person faces depends on what he/she owns, what exchange possibilities are offered to him/her, what is given to him/her for free and what is taken away from him/her (Sen, 1981: 4).

Measurement of the causes and symptoms of poverty can be carried out in two main ways; firstly, through looking at objective social indicators such as income and expenditure levels, standards of housing and sanitation, and life expectancy (an objective measure of the quality of life) and secondly, through subjective indicators such as needs and perceptions of the quality of life (May *et al*, 1995).

1.3 POVERTY IN SOUTH AFRICA AND MORE SPECIFICALLY IN KWAZULU-NATAL

Many South Africans are unable to satisfy their essential needs while a minority enjoys prosperity. While this problem is not specific to South Africa, it is widely acknowledged that the role played by institutionalized discrimination is specific to South Africa.

Apartheid legislation produced extreme inequality with more than 18 million of its 40.2 million citizens being classified as living in a state of poverty in 1998 (May *et al*, 2000). South Africa displays very unfavourable measures of human development in comparison with other middle-income countries (Table 1). Wide variations in life expectancy, infant mortality and adult literacy between race groups, gender and location emphasize the inequalities present in the South Africa (May, 1998). The following statistics highlight these inequalities:

- In 1994 life expectancies at birth were 60.3 years for Blacks, 66.5 for Coloureds, 68.3 for Indians and 73.1 for Whites. By 1999, the average life expectancy for South Africa had fallen to just 47.8 years (CSS, 1996: 24; Strategic Planning and Research Department, 2001: 12). This drop in life expectancy could be due to the increased number of mortalities caused by AIDS. Since the onset of the AIDS epidemic it has been reported that over 500 000 people in South Africa have died from AIDS or related causes (Lewis, 2000) and it is projected that by the year 2011 25 percent of working adults will be HIV positive (Development Resource Centre, 2001). The death toll is projected to increase to over 10 million by the year 2015 leading to a decrease in life expectancy to 40 years (Lewis, 2000).

- In 1995 the average number of formal school years of adults over 20 was 5.53 for Blacks, 6.94 for Coloureds, 8.78 for Indians and 11.02 for Whites with the average for South Africa being 6.68 (CSS, 1996: 38).

- In 1995 the literacy rate was 76.64 percent for Blacks, 91.06 percent for Coloureds, 95.48 percent for Indians and 99.52 percent for Whites with the average for South Africa being 82.16 percent (CSS, 1996: 41).

Table 1: Key poverty indicators for South Africa and other countries grouped by income status, 2000

Indicators	South Africa	World	Low income countries	Middle income countries	High income countries	Sub-Saharan Africa
Total population	42.8 million	6.1 billion	2.5 billion	2.7 billion	0.9 billion	0.7 billion
Annual population growth (%)	1.6	1.3	1.9	1.0	0.7	2.4
Life expectancy at birth (Years)	47.8	66.5	58.9	69.5	78.1	46.5
Fertility rate (Births/woman)	2.9	2.7	3.6	2.2	1.7	5.2
Mortality rate (Infants/1000 births)	62.8	53.8	76.1	31.3	5.7	91.2
Mortality rate under 5 years (Infants/1000 births)	79.0	77.8	114.9	39.0	7.3	129.3
Urbanized population (%)	55.0	47.0	31.9	50.1	78.8	34.4
Illiteracy rate: males (%)	14.0	–	28.3	9.0	–	30.1
Illiteracy rate: females (%)	15.4	–	47.0	19.2	–	46.7

Source: SA Data Profile, 2001; World Bank, 2000b.

- The Human Development Index (HDI) is a measure of people's ability to live a long and healthy life, communicate with and participate in the life of the community, and to have sufficient means for a decent living (CSS, 1996: 25). For South Africa the HDI was 0.677 in 1995 and 0.697 in 1999. In 1995 the HDI for Blacks was 0.5, for Coloureds 0.663, for Indians 0.836 and for Whites 0.897 (Strategic Planning and Research Department, 2001: 15).

- In 1999 the mortality ratio of non-poor to poor in South Africa was 1:1.7 for male adults (15-59) and 1:3.6 for female adults. Amongst infants (0-5 years of age) these ratios were 1:4.7 for males and 1:5.3 for females (White and Killick, 2001: 10).

- In 1993 the poverty headcount based on national poverty lines was 44 percent for South Africa, 40 percent for urban residents and 86 percent for rural people (White and Killick, 2001: 10).

KwaZulu-Natal is South Africa's largest province in terms of population, accounting for one fifth of the country's 40.2 million people but only 7.6 percent of its area. The result is a population density of almost 95 people per km² (CSS, 1995). The province is ethnically diverse with 82.7 percent of its population comprised of Africans, 9.2 percent Indians, 6.9 percent Whites and 1.2 percent Coloureds. Although not the poorest province, KwaZulu-Natal is still poor (63 percent of its population live in poverty) even though a relatively large percentage of its population is urbanized (38.2 percent) (May *et al,* 2000; CSS, 1995). In 1995 the povince's average life expectancy was 61.65 years and the dependency ratio was 76.2 percent. Only 23.8 percent of the population has more than nine years of schooling with the average level of schooling being 6.48 years. Adult literacy, at a rate of 84.3 percent, is on a par with the national average (CSS, 1995).

1.4 THE MEASUREMENT OF POVERTY INDICATORS

Ideally, the indicators used in statistical measurement of poverty should be objective indicators that can be measured and compared, rather than subjective indicators. The latter are matters of opinion, making accurate comparison and measurement impossible. The following objective indicators are frequently used in empirical poverty studies:

1.4.1 Income

Income can be used as one indicator out of many in the measurement of poverty, or - when using the income approach to poverty measurement - the only indicator. There are however

difficulties associated with the estimation of rural incomes, their distribution and consumption (May and Posel, 1992). For example, there is the problem of whether to use individual or household levels of income as the two often produce very different results. Many poverty studies use estimates of household income per capita or (better) per adult equivalent to account for per capita income disparities in household size and structure. In the case of cross-sectional studies, income estimates reflect only current annual incomes, which may be strongly influenced by random events such as drought, recession, social and political forces and the phase of the households' life cycle.

1.4.1.1 Sources of income

In the communal areas of South Africa, sources of rural household income are often similar with overwhelming reliance being placed on wage remittances and pensions (May and Posel, 1992). In Table 2, income attributed to Pensions represents all income from welfare transfers, while income from Entrepreneurs refers to income earned by those household members who engage in micro-enterprises. Very little cash income is earned from farming as most agricultural products are used for consumption rather than sale. The situation is quite different in countries like Pakistan where agriculture accounts for almost a quarter of per capita household income (Adams and He, 1995). Poor households that depend heavily on agriculture tend to be vulnerable to income shocks because farming is prone to drought, flooding, etc (Adams and He, 1995).

1.4.1.2 Level of income inequality

Clearly there is a need to look beyond the question of whether a community is poor or not to the ranges of poverty that exist within that community. Roby and Miller (cited by Sen,1981: 14) used this inequality approach to identify levels of poverty. In this approach

the proportion of income commanded by the poorest 10-20 percent of a population is analysed, with the main concern being to shift those at the bottom into higher income strata. In this sense movement between poverty levels is easy to monitor (Sen, 1981: 14).

Table 2: Urban and rural incomes by source of income in South Africa and KwaZulu-Natal

Income source	Percentage of household income		
	Rural households SA	Urban households SA	Rural households KZN
Wages and remittances	57	74	64
Pensions	26	3	14
Entrepreneurs	13	19	16
Sale of surplus produce	4	4	6

Source: Woolard 2002; May and Posel,1992.

Table 3: Share of income attributed to the poorest and richest 20 percent of the total population

High inequality countries	Lowest 20%	Highest 20%	Low inequality countries	Lowest 20%	Highest 20%
Honduras	1.6	61.8	Slovak Republic	11.9	31.4
Bolivia	1.9	61.8	Japan	10.6	35.7
Paraguay	1.9	60.7	Austria	10.4	33.3
Brazil	2.6	63.0	Czech Republic	10.3	35.9
Swaziland	2.7	63.4	Bulgaria	10.0	36.8

Source: World Bank, 2001.

Table 3 illustrates differences in income distribution between countries of high and low income inequality. Table 4 shows that while levels of income inequality are high within the rural areas of South Africa, they are lower than those of the high inequality countries listed in Table 3.

Table 4: Distribution of household income in rural South Africa

Population strata	Percentage of income earned
POOREST 20%	3.4
20 – 40%	8.1
40 – 60%	11.7
60 – 80%	21.4
RICHEST 20%	55.4

Source: May and Posel, 1995.

The Gini coefficient is a very common measure of inequality based on the Lorenz curve – a cumulative frequency curve that compares the distribution of a specific variable with a distribution that represents equality. To compute a Gini coefficient for income, all income units (individuals or households) are first ranked in ascending order of magnitude of income. The cumulative percentage income of the units is then graphed against the cumulative percentage of the units. In a perfectly equal society where each unit receives the same income the resultant Lorenz curve will coincide exactly with the diagonal. In reality the curve will be a shallower or deeper curve to the right of the diagonal (Castillo-Salgado *et al*, 2001). The Gini coefficient ranges from zero to one, with zero representing perfect equality and one total inequality. It corresponds to twice the area between the Lorenz curve and the diagonal. Although the absolute level of inequalities is reflected in the value of the Gini coefficient itself, it is usually interpreted in comparative terms by contrasting the calculated value to that of other geographic units, populations, etc. (Castillo-Salgado *et al*, 2001).

South Africa is reported to have the world's second worst Gini coefficient after Brazil (UNDP, 1997). In 1996, South Africa's Gini Coefficient was 0.69. By contrast, Gini coefficients computed for India, USA and the Netherlands were 0.42, 0.38 and 0.27 respectively. Within South Africa, income inequalities are greatest amongst the African

population and smallest amongst the White population (with Gini coefficients of 0.66 and 0.50 respectively).

1.4.2 Assets

When analysing the determinants of poverty in all its dimensions it is necessary to consider people's assets, the returns to (or productivity of) these assets and the volatility of the returns. Assets can be classified into several groups, these being; human capital such as skills and the capacity for basic labour, natural assets such as land, physical assets such as access to infrastructure, financial assets or economic wealth such as access to savings and credit, and social assets which can be classified as networks of contacts and political influence over resources (World Development Report, 2000/2001).

The productivity of these assets depends on access to markets. Access to assets is influenced by formal institutions and customary norms which define property rights. Discrimination on the basis of gender, ethnicity, race or social status, or the political influence of different groups may also affect a person's access to assets (World Development Report, 2000/2001).

The volatility of returns on these assets must also be noted with volatility resulting from market fluctuations, changing weather conditions and turbulent political conditions. These shocks also affect the market, collateral and liquidity value of assets (World Development Report, 2000/2001).

1.4.3 Quality of life

A number of indicators are typically included in the measurement of quality of life. These indicators deal mainly with a community's access to basic amenities and the factors determining their availability or non-availability (Ardington, 1988; Statistics Canada, 2000). Such indicators can be aggregated into a Basic Needs Indicator, a non-income method of poverty assessment. In this method, scores are assigned to each indicator showing its degree of availability. Subjective rankings can be avoided by using discrete scores of one or zero to show the presence or absence of a particular indicator (May *et al*, 1995).

1.4.3.1 Housing

It is not just knowing what type of dwelling a household lives in that is important in poverty measurement as this may not give any indication of what the merits of the dwelling are. It therefore is very important to ascertain what the density of occupation is, what the dwelling is constructed of, and whether or not the dwelling is fit for habitation. Leipert and Simonis'(cited by May *et al*, 1995) Level of Living Index categorizes the density of occupation as:

- Less than 0.25 rooms per person
- Between 0.25 and 0.99 rooms per person
- Between 1 and 1.49 rooms per person
- Greater than 1.5 rooms per person.

This index states that a dwelling is habitable only if it is has a density of occupation greater than one.

1.4.3.2 Water

In most developing countries access to safe or potable water in rural areas poses a critical problem. At the World Summit on Sustainable Development held in Johannesburg in 2002 it was stated that worldwide 1.1 billion people lack access to safe water (Annan, 2002). In South Africa this problem was particularly acute in 1994 at the end of the apartheid era with 14 million people out of a total population of 42 million being reported to have no access to a safe water supply. In seven years, South Africa has halved the number of people who lack access to safe water (Kasrils, 2002). However, it is not just access to safe water that indicates poverty, but also the source of water used for domestic purposes, whether the water source is adequate, whether the same source of water can be used for all domestic purposes, the number of households that fetch water and the time that it takes to collect that water.

1.4.3.3 Sanitation

When assessing sanitation levels there are two different criteria that must be addressed. First, the type of toilet that the household has access to must be ascertained. A number of sanitation technologies exist: full waterborne, septic tank, bucket collection, ventilated improved pits, unimproved pits and other intermediates (e.g. conservancy tanks). The Palmer study (cited by May *et al,* 1995) defined a sanitation technology as adequate when: it facilitates or contributes to the establishment of a household environment that is hygienic; is not detrimental to the environment in the treatment and disposal of wastewater; is acceptable to the community in which it is in use; and is easily sustained and managed by the local authority or community.

Second, the location of the toilet must be assessed. If the toilet is outside the homestead

then the number of households that share the toilet must be considered, as well as the condition and structure of the toilet

1.4.3.4 Energy use

Measuring access to energy requires more than just asking the question "is there an electricity connection in the household or dwelling?" The percentage of households connected to energy is important, but so too is finding out the main source of energy used for domestic purposes such as lighting, cooking and heating. Accessibility and affordability of energy affects the choice of energy source used. Electricity is simply not available in many of the sparsely populated rural areas of South Africa, and wood is often a privately cheaper source of energy than electricity for cooking and heating in the short-term. In addition, there are non-price considerations for households when choosing an energy source, such as environmental and health issues associated with a particular source of energy. Paraffin and coal are regarded as being dirty, dangerous and poisonous, with paraffin fumes causing difficulty in breathing (May *et al*, 1995). The impact of different energy sources on the time of household members is also an issue to be considered. Wood, for example, takes more time to gather and to prepare meals (May *et al*, 1995).

1.4.3.5 Education, health and nutrition

There is a strong positive correlation between the level of education and standard of living. In South Africa the poverty rate among people with no education is 69 percent compared to 54 percent among people with primary education, 24 percent among those with secondary education and 3 percent among those with tertiary education (May, 1998). There is also a strong positive correlation between poverty and poor health. However, this relationship is more difficult to measure and is compounded by poor access to effective health care.

Poverty studies should therefore look beyond measures of formal education and morbidity to the availability of community services such as schools and clinics (May, 1998).

Johnson and Clarke (1982:51) specify the health outcomes of poverty as: increased levels of chronic illness; increased child mortality rates (the interaction between infection and malnutrition, particularly during the wet preharvest season when food stocks are low and labor demands high, appears to be a significant source of persistent high mortality and morbidity among children); and increased rates of behavioral disorder (malnutrition during the first three years can lead to impaired mental as well as physical development – although, the latter need not be a permanent condition). According to Sen (1981: 13) malnutrition captures an important aspect of poverty, particularly in developing countries.

CHAPTER 2
EMPIRICAL MEASUREMENT OF POVERTY

The ultimate objective of development is to improve the quality of life of people. It has become increasingly important in developing countries to assess the degree of poverty of people before and after any impact on them (Booker et al, 1980). When measuring poverty there are two basic requirements: First, it is necessary to define a method of measuring the "standard of living", i.e. constructing an index of poverty using available information on the poor. Second, there has to be a defined "cut off" which separates those who are identified as poor from those who are non-poor (Grootaert and Kanbur, 1990: 13). In other words, it is necessary to define a criterion of poverty such as a poverty line and then to identify those who exceed that criterion and those who do not (Ngwane *et al*, 2001).

A poverty line (i.e. a line that is regarded as a minimum level of living standard) allows for not only the determination of the number of poor people but also the depth and severity of poverty (Leibbrandt and Woolard, 1999). In practice, there is usually not just one poverty line, but many; this reflects the fact that two roles are served by poverty lines. The first role is to determine a minimum standard of living required before a person is no longer classified as poor. The second role is to make interpersonal comparisons; poverty lines for families of different sizes, composition, location and season show what expenditures are needed in each set of circumstances to make sure that the minimum standard of living required to escape poverty is reached (Ravallion, 1996).

There are three types of poverty line: the absolute poverty line which is fixed at a value (i.e. does not change with the standard of living in a society); the relative poverty line

whereby a person is defined as poor relative to others in the same society or economy (for example, the poverty line may be set at the median income value); and the subjective poverty line which is based on households' perceptions of their needs (Ngwane *et al*, 2001; Leibbrandt and Woolard, 1999).

When making comparisons between households or families, differences in terms of age and size structure must be taken into account for accurate poverty measurement. When considering household size it should be noted that the relationship between size and expenditure is not linear because larger households benefit from economies of scale in consumption. In addition, household size means more than just the total number of people making up the household – for example, a household with two adults and one child should consume more than a household made up of one adult and two children. In order to account for differences in household composition, household size must therefore be converted into a number of adult equivalents and adjusted to take into account economies of scale (Leibbrandt and Woolard, 1999). May *et al* (1995) set an empirical precedent for South Africa stating that all children younger than 15 years of age can be regarded as having half the consumption requirements of an adult. They also assume scale economies of 0.9 in consumption. Average effective household expenditure is therefore calculated as:

$$\textit{Total household expenditure} / (\textit{adults} + (0.5)\ \textit{children})^{0.9}$$

Where the denominator estimates the households size in terms of adult equivalents.

When estimating poverty worldwide, it is convenient to express the poverty line in a common unit across countries. For this reason a monetary poverty line is often used. The World Bank uses poverty lines set at US$1 and US$2 per day measured in terms of 1993 Purchasing Power Parity (PPP), where PPP measures the relative purchasing power of

currencies across countries. Estimates for 1998 suggest that 1.2 billion people world-wide had consumption levels below $1 a day, and that 24 percent of the population of the developing world (2.8 billion) lived on less than $2 a day (World Bank, 2000c).

Section 2.1 describes some of the more common approaches to empirical measurement of poverty, while section 2.2 summarizes three recent studies undertaken in South Africa, two of them in the province of KwaZulu-Natal. Section 2.3 contrasts these approaches with that proposed for this study.

2.1 METHODS OF POVERTY MEASUREMENT

2.1.1 The income or expenditure approach

This approach defines a person as poor if their income or expenditure is below a particular poverty line (Ngwane *et al*, 2001), and therefore requires estimation of the minimum income at which all the specified basic needs can be satisfied. The income approach is therefore a method of predicting a person's ability to meet his or her minimum needs (Sen, 1981: 27). Income or expenditure measured at the household level is usually standardized through the use of equivalence scales such as the adult equivalent scales.

The income approach to poverty measurement was adopted in the Household Expenditure Survey (HES) carried out in Singapore during 1997/98. An absolute poverty line was estimated from the Minimum Household Expenditure (MHE) computed from actual expenditure on subsistence food, clothing and shelter. This subsistence budget was then inflated with a multiplier of 1.25 to account for other necessary expenditures of normal living. Apart from the subjective elements of this assessment and its failure to apply equivalence scales to improve comparability, the survey ignored income that was not

earned through formal employment and which may have shifted a household over the poverty line (Singapore Department of Statistics, 1999).

In South Africa the most common measures of poverty derived from poverty lines are the headcount ratio (i.e. the proportion of the population that falls below an absolute poverty line) and the poverty gap index (i.e. the distance that a poor person is from the absolute poverty line). The headcount ratio is simple to construct and easy to understand, but it does not take into account the intensity of poverty. It therefore ignores Dalton's (1920) transfer principle which states that an index of poverty should improve when income transfers from the rich to the poor, and it fails to indicate just how poor the poor people are, i.e. the headcount ratio does not change if people below the poverty line get poorer. The poverty gap index, on the other hand, does reflect the depth of poverty among the poor, with the aggregate poverty gap showing the cost of eliminating poverty by making perfectly targeted transfers to the poor in the absence of transaction costs and disincentive effects. The squared poverty gap index provides a measure of the inequality that exists among the poor. It is a weighted sum of individaul poverty gaps that places more weight on observations that fall well below the poverty line (Khandker, 2001). These three measures of poverty are special cases of the general class of decomposable income measures proposed by Foster, Greer and Thorbecke (cited by Leibbrandt and Woolard, 1999).

Leibbrandt and Woolard (1999) applied these three different FGT (Foster-Greer-Thorbecke) measures to the South African data presented in Table 5 and computed provincial poverty shares for each of the nine provinces. The poverty shares computed for each province change when different versions of the FGT are used. KwaZulu-Natal had a poverty share of 21 percent when the headcount index was used, 17 percent when the

poverty gap index was used and 15 percent when the squared poverty index was used. This shows that although there are a large number of people below the poverty line in KwaZulu-Natal the percentage that are very poor is somewhat lower (Leibbrandt and Woolard, 1999). The absolute poverty lines presented in Table 5 range from R132.60/month to R297.21/month. These discrepancies reflect differences in both the subjective assessment of minimum living standards and the standardization of household income.

Table 5: Comparison of selected poverty lines for South Africa, 1993

Types of poverty line	Cutoff (Rands/month)	Percentage of population below the poverty line
Population cut off at 40th percentile of households ranked by adult equivalent expenditure stated by Leibbrandt and Woolard	297.21(per adult equivalent)	53.2
Minimum and supplemental living levels per capita set by the Bureau of Market Research, University of South Africa. Supplemental Living Level (SLL)	220.10	56.7
Minimum Living Level (MLL)	164.20	44.7
Per adult equivalent household subsistence level (HSL) set by the Institute for Development Planning Research, University of Port Elizabeth	251.10(per adult equivalent)	45.7
International poverty line (US$1 per capita per day) (1993 prices)	132.60	23.7

Source: Leibbrandt and Woolard 1999.

Comparisons between studies and countries are bound to be misleading in the absence of a consistent definition of the poverty line. More importantly, measurement of poverty using income alone may fail to capture other crucial aspects of poverty and hence its causes. Since the dynamics of poverty generation are not addressed there is little insight into

poverty reduction except for income transfers (Fergay, 1998). White and Killick (2001:11) recommend that income should be used in conjunction with other measures of poverty.

2.1.2 The unmet basic needs method (UNB)

The UNB method of poverty measurement does not focus on the capability of a household to acquire goods and services, but rather on whether or not a household is actually satisfying those basic needs. A household is defined as poor if defined thresholds for some or all of the basic needs are not met.

Again, this form of poverty measurement suffers a major drawback in that it requires subjective assessments of basic needs. According to the UNDP (1997:26) there are at least five different basic needs, namely: current income; rights to public goods and services; property and assets which provide basic consumption services; education or skills and capabilities; time for recreation, housework and education. Application of the UNB method to Latin American data generally ignored all but two of these basic needs; access to public goods and services on the one hand, and housing on the other (UNDP, 1997: 26). This leads to a partial view of poverty, resulting in underestimation of the level of poverty present. Clearly a major disadvantage of using the UBN method is that the incidence of poverty is not independent of the number of items included. Poverty incidence rises each time an additional item is added (UNDP, 1997:27).

2.1.3 The capability approach

This approach makes use of the UNDP (1997: 16) concept of the Capability Poverty Measure (CPM) developed in 1996. This simple index is comprised of three indicators reflecting the percentage of the population with capability shortfalls in three basic

dimensions of human development, namely: living a healthy and well-nourished life; having the capability of safe and healthy reproduction; and being knowledgeable and literate. The CPM differs from the Human Development Index in that it focuses on the lack of capabilities faced by people rather than the average level of capabilities present, and it does not include a measure of income (Swartz, 1996). Weights attached to variables in poverty indexes are usually subjective, undermining the reliability of comparison across regions. While the absence of a single numerical development indicator does make analysis more difficult, it does help to reveal processes of poverty generation and reproduction and is therefore useful in poverty eradication planning (Fergay, 1998).

2.1.4 The human capabilities approach

This method of poverty measurement uses the UNDP concept of the Human Poverty Index (HPI) developed in 1997. The HPI focuses on deprivation in three essential dimensions of life, namely: longevity; knowledge; and a decent standard of living (Ngwane *et al*, 2001). This approach is very similar to the capabilities approach and thus suffers from the same problem.

2.2 RURAL SOUTH AFRICAN POVERTY STUDIES

One of the effects of past apartheid policy was the virtual absence of credible and comprehensive data on poverty levels and standards of living of the poorer citizens of South Africa. The National Party Government not only showed little interest in collecting and analyzing information of this nature, but also suppressed data that depicted poverty in the former Bantustan areas (May *et al,* 2000). While surveys continued to be undertaken in these areas, the commissioning and release of reports and data were often subject to the whims of Bantustan governments. Various studies undertaken by the Development Bank of

Southern Africa (DBSA) tried to fill this gap, but it was not until the mid 1990's that comprehensive surveys started taking place (May *et al,* 1999). For these reasons the main poverty measurement studies carried out in South Africa have been implemented over the last ten years, these being the Living Standards Measurement Study (LSMS) and the KwaZulu-Natal Income Dynamics Study (KIDS). There was, however, a smaller-scale study of the strategies adopted to alleviate poverty in a rural community carried out by Ardington (1988) in the early 1980's in the Nkandla District of KwaZulu-Natal.

2.2.1 Nkandla district

In 1982, seventy of the 480 households located in the magisterial district of Nkandla were surveyed with the aim of analyzing standards of living in the area. The results of the first sample survey clearly showed how the fortunes of the community were governed by the way in which scarce resources (mainly pensions and remittances) were distributed. Local lifestyles were shown to be largely determined by levels of migratory employment and national welfare transfers, i.e. they were determined externally in the urban economy. Beyond these livelihoods, local strategies adopted by households and individuals to alleviate poverty were very limited.

A second longitudinal survey was carried out in the same area in 1985 with the same households being panelled as far as was possible (four households no longer existed and four had split up into smaller units). The main aim of the panel survey was to establish what strategies the households had adopted in reaction to the changing social and economic circumstances in which they found themselves. The 1985 survey confirmed that the incomes, living conditions and lifestyles were externally determined, and that most of the changes between surveys were likewise the result of changes in the external economy

(Ardington, 1988). This suggests that factors such as location (proximity to urban jobs), infrastructure (access to all-weather roads), human capital and the rate of unemployment are important determinants of poverty in KwaZulu-Natal.

2.2.2 Living standards measurement survey

The South African Living Standards Measurement Survey (LSMS) has also been referred to as the Project for Statistics on Living Standards and Development (PSLSD), the South African Integrated Household Survey (SAIHS) and the South African Labor and Development Research Unit (SALDRU) survey. The World Bank established the Living Standards Measurement Study in 1980 to explore different methods of improving the type and quality of household data collected by government statistical offices in developing countries. The specific objectives of the LSMS were to; develop new methods of monitoring progress in standards of living, identify the consequences of current and proposed government policies for households, and to improve the level of communication between policymakers, statisticians and analysts. Due to the fact that living standards can be measured in a variety of dimensions, LSMS surveys were designed to collect data on all major aspects of household wellbeing (Grosh and Glewwe, 1993: 80).

A very similar format was followed for the first few LSMS surveys, but, as time passed and countries with different circumstances were added, a substantial degree of variety arose in the surveys across different countries (Grosh and Glewwe, 1995). The LSMS surveys involved two visits to the household within a fortnight and provide a relatively complete picture of a household's living standards, although seasonal and month-to-month variations in expenditure patterns are not captured. This can introduce bias to the results of such surveys (World Bank, 2000b).

The 1993 LSMS survey was the first South African cross-sectional national household survey. It was undertaken by a consortium of South African survey groups and Universities under the management of SALDRU at the University of Cape Town with financial and technical support from the World Bank and the governments of Denmark, The Netherlands and Norway. The sample was selected using a two-stage, self-weighting sampling design and comprised of approximately 9000 households in 360 clusters (May *et al*, 2000).

A comprehensive household questionnaire was used to collect a broad array of information on socio-economic living conditions. The questionnaire included sections on household demographics and environment, education levels, expenditure on food and non-food items, income and employment, agricultural activities and health. A community questionnaire, which was completed for each cluster in the sample, dealt with issues such as school and health care availability and the prices of key commodities available in the area (May *et al*, 2000).

The 1993 LSMS survey was a nationally representative survey that provided hard statistical information about conditions under which South Africans live. These data were useful in identifying vulnerable households and regions (May *et al*, 2000) and therefore in targeting public resources to alleviate the symptoms of poverty. Leibbrandt and Woolard (1999) compared expenditure-based poverty lines computed for South Africa in 1993 and showed that while KwaZulu-Natal had the second highest incidence of adult equivalents earning less R301 per month, both the Eastern Cape and Northern Province had higher poverty shares when the poverty measure was extended to include information about the depth of poverty. While such refinements could improve the allocation of scarce public resources, the results do not address policy questions about how best to apply these

resources.

2.2.3 KwaZulu-Natal income dynamics study

This study was based on a panel survey of the 1993 LSMS within the province of KwaZulu-Natal. It was carried out in 1998 by a research consortium including the University of Natal, the University of Wisconsin and the International Food Policy Research Institute (IFPRI) to address research questions concerning the dynamics of poverty in South Africa (May *et al*, 2000). The 1998 survey excluded white and coloured households (because the value of resurveying small and relatively wealthy ethnic groups in the province was felt to be minimal). There were 1558 households of all races in the 1993 survey with only 112 being white and 53 coloured.

The 1998 questionnaire was very similar to the 1993 LSMS questionnaire with some important differences:

- Greater focus on individual ownership and control of assets in order to analyze poverty by gender.
- Increased emphasis on individuals not actually living in the household but who contributed to its welfare.
- The inclusion of four new sections – economic shocks, social capital, assets brought into marriage and household decision-making.

The most immediate use of the longitudinal KIDS data was to distinguish between those who were sometimes poor and those who were consistently poor over the period of study. This movement of poverty measurement was achieved using transition matrices that depicted changes in income position of households interviewed in both rounds of surveys.

The transition matrix was based on scaled per capita monthly expenditure estimates (1998 prices were deflated to 1993) using a community specific price index computed from 12 commodities. Based on their scaled per capita expenditure, households were placed in different expenditure groups according to their position relative to a monetary poverty line (R273 per adult equivalent per month).

The results of this measurement showed that two-thirds of the households that were below the poverty line in 1993 remained there in 1998 although 48.5 percent of the households who had been earning less than half the poverty line had moved up to earn more than half the poverty line. Of those households above the poverty line in 1993, one-third had moved up a class while nearly half had fallen below the poverty line.

The KIDS project was designed to understand the mechanisms and forces contributing to the perpetuation of poverty and inequality. The analysis identified those households whose full asset or endowment bundles made it impossible to escape from poverty. According to May *et al* (2000), this process can reveal policies required to relieve persistent poverty.

2.3 PROPOSED MEASUREMENT APPROACH

This study does not define subjective poverty thresholds. Instead it examines relative poverty within the community studied, where well being is assessed in terms of four seperate and objectively measured symptoms of poverty, namely: housing (a quality index of building materials, water and sanitation); health; income; and wealth. Weights attached to variables included in the housing index were computed using Principal Components Analysis (PCA). Cluster Analysis (CA) is then used to group study households with similar poverty profiles. In this way, the data and not the researcher define groups of households

that differ in the type and relative level of poverty that they face. For policy purposes, variables representing possible causes of poverty are then used to distinguish between the poverty groups using Linear Discriminant Analysis (LDA).

CHAPTER 3
EMPIRICAL ANALYSIS

The main objectives of the empirical analysis are to: gather information on variables associated with the symptoms and causes of poverty in a rural community that benefited from government land reform grants; cluster households into groups with similar symptoms of poverty using Cluster analysis; examine group characteristics (relative poverty); and investigate relationships between groups to rank and identify possible causes of poverty using Linear Discriminant Analysis.

3.1 DATA COLLECTION

A census survey of 38 land reform beneficiary households – members of a Communal Property Association (CPA) established to purchase Clipstone, a 630 hectare subdivision of the farm Sherwood in the Midlands of KwaZulu-Natal, 70 kilometers northwest of Pietermaritzburg – was conducted from 6-20 May 2002 with the help of two facilitators employed by Lima Rural Development Foundation. A structured questionnaire was completed for each household with questions answered by the household head. A household was defined as a group of people who live and take meals together with daily commuters being included as members of the household, but weekly commuters and migrants not being included. It must however be noted that income remitted by weekly commuters and migrants was included as a source of household income.

In 1999, farm workers and their families living on Sherwood applied to the Department of Land Affairs (DLA) for "Labor Tenant" status in order to qualify for the DLA's Settlement/Land Acquisition Grant (SLAG) of R15 000 per beneficiary household. An

agreement of sale was negotiated between the owners of Sherwood and the beneficiary households represented by the eGamalethu CPA. During 2000-2001, all but five of the labor tenant families relocated to Clipstone while waiting for the DLA to award their grants and complete the land transaction. These moves were premature in the sense that the beneficiaries occupied Clipstone without the benefit of a land use plan or essential services. Although the farm was officially transferred to the CPA in August 2002, planners had not yet been appointed at the time of writing, nor had the balance of SLAG been lodged with the Umgeni District Council to pay for basic infrastructure. In addition, the beneficiaries face an immediate problem in that Clipstone cannot sustain their collective herd of 300 cattle, as the land only has a carrying capacity of approximately 132 animal units. Some livestock died during the winter of 2002 and many had to be sold owing to their poor condition.

To address this problem, an equity-sharing scheme has been proposed that will allow the beneficiaries to exchange cattle for financial equity in a commercial beef enterprise on Sherwood, which is capable of supporting a herd five times larger than the herd it currently supports. Many of the female-headed beneficiary households indicated that they would pay cash for shares in the proposed enterprise as they owned few or no cattle and therefore derived little benefit from the (extensive grazing) land purchased by their CPA. If successful, the joint venture could relieve pressure on Clipstone's grazing resources, reduce the risk of cattle dying and increase the incomes and wealth of shareholders through expert management of a larger commercial herd on Sherwood.

The equity-sharing project is being facilitated by Lima with funding from USAID's Broadening Access and Strengthening Market Input Systems (BASIS) Collaborative

Research Support Programme (CRSP). Monitoring changes in the welfare of this community over a period of 2-4 years forms an important part of this BASIS CRSP.

3.2 DATA ANALYSIS

Responses to qualitative questions were coded on scales that were ultimately aggregated to construct dummy variables scoring one or zero to indicate the presence or absence of certain attributes. Data gathered in the census surveys were captured in electronic worksheets using Microsoft Excel© and checked for errors by examining descriptive statistics computed using SPSS V.11.5 (Norusis 1994: 83-109).

Table 6: Household descriptive statistics for the symptoms of poverty, *n*=38

Poverty dimension	Variables	Definition	Mean	Standard error of mean
Housing	Walls	Brick/stone = 1, 0 otherwise	7.89%	27.3
	Water	Protected water source = 1, 0 otherwise	5.26%	22.6
	Sanitation	Adequate = 1, 0 otherwise	63.2%	48.9
Income	Income	Monthly cash income in Rands per adult equivalent	R219.92	R185.08
Health	Morbidity	Number of adult equivalent household members that have visited a doctor in the last 2 months	0.133	0.226
Wealth	Livestock	Value of livestock in Rands per adult equivalent	R2570.90	R2299.66

Note Adult equivalent (A.E.) = (adults + (0.5) children)$^{0.9}$

Source: Shinns and Lyne, 2003.

Table 7: Household descriptive statistics for possible causes of poverty *n*=38

Poverty cause	Variables	Definition	Mean	Standard error
Human and social capital	Junior	Number of adults with schooling below grade 7 per adult	1.790	0.197
	Senior	Number of adults with schooling between grades 7 and 10 per adult	0.684	0.161
	Matric	Number of adults with grade 12 per adult	0.068	0.021
	English	Number of adults who can speak English	1.211	0.224
	Support	Has borrowed money from relatives = 1, 0 otherwise	0.053	0.037
	Transport	Number of vehicles owned	0.105	0.051
Location	Road	Kilometres to district road	9	0
	Taxi	Kilometres to taxi service	9	0
	Telephone	Kilometres to telephone	2	0
	Bank	Kilometres to bank	30	0
	Post Office	Kilometres to Post Office	2	0
Gender and household characteristics	Female Head	Head of household is female =1, 0 otherwise	0.368	0.079
	Femininity Ratio	Number of female adults per male adult	0.554	0.039
	Pensioner Ratio	Number of pensioners per adult	0.086	0.030
	Dependency Ratio	Number of infants, scholars, disabled and unemployed household members per wage earner	1.892	0.304
	Adult Equivalents	(Adults + (0.5) children)$^{0.9}$	4.428	0.33

Source: Shinns and Lyne, 2005.

3.2.1 Symptoms of poverty

Descriptive information elicited about the symptoms of poverty is presented in Table 6 which groups objectively measured variables by the dimensions defined in Section 2.3, namely: housing; income; health and wealth. Within the housing category, the type of exterior wall was coded as zero for any material other than brick or stone. Mud and branches, tarpaulin and iron sheets are inferior in terms of insulation and weathering over time. Protected sources of water (piped water and covered boreholes) are ranked above

unprotected sources (rivers, streams and wells) in terms of health standards. Sanitation is considered adequate for ventilated pit latrines, and inadequate for unimproved pit latrines. Density of occupation was excluded from the PCA because additional rooms were still being added to many of the new homesteads. Household wealth was measured only in terms of livestock as there were virtually no other liquid assets (there is no sale market for land) or financial assets recorded in the survey.

3.2.2 Causes of poverty

Variables representing causes of poverty observed in the cross-sectional survey are presented in Table 7. Note that there is no variation in the mean values computed for distances to services because the beneficiary households reside in close proximity to one another.

3.3 EMPIRICAL TECHNIQUES

3.3.1 Principal component analysis (PCA)

PCA is a data reduction method that seeks to create an entirely new set of variables, smaller in number, to partially or completely replace the original set of variables (Hair *et al*, 1998: 24). The aim is also to have minimal loss of information. In this study the purpose of PCA is to economize on variables, i.e. to construct an interval level index measuring the quality of housing from the variables Walls, Water and Sanitation. The three correlated variables are transformed into a smaller set of uncorrelated indexes in such a way that the first index accounts for as much of the variation as possible. The second and following indexes account for as much of the remaining variance as possible but in descending order without being correlated to any of the other, previous indexes. These indexes or principal components are estimated as linear functions of the original variables

(Daultrey, 1976):

$$PCi = a\,i\,1X1 + a\,i\,2X2 + \ldots + a\,i\,mXm$$

where PC i = score on the ith principal component

i = 1...m

X1...Xm = standardized variables measuring the quality of housing.

a i 1...a i m = the principal component loadings

The number of principal components to retain depends on:

- The percentage of variance accounted for by the principal component
- The absolute variance accounted for by the principal component (its eigen value should exceed unity)
- The ability of the principal components to be interpreted meaningfully (Daultry, 1976)

3.3.2 Cluster analysis of variables (CA)

Cluster analysis is commonly used to define groups of observations with maximal homogeneity within the groups and maximum heterogeneity between the groups. The technique is often used to better understand the basic structures of the data set or to create a foundation for subsequent analysis of dependence relationships (Norusis, 1994: 100). Cluster analysis is based on measures of proximity (such as Euclidian distance) that are used to compare individual observations. The basic data for cluster analysis describe a set of *n* individuals or cases on which *p* measurements (variables) have been recorded.

There are a number of cluster algorithms but two basic categories can be distinguished, namely Hierarchical and K-Means Cluster Analysis (Hair *et al*, 1998: 26). K-Means Cluster analysis produces only one solution for a predetermined set of clusters. Hierarchical Cluster analysis, the method employed in this study, involves the construction of a hierarchy of treelike structures with each observation starting out its own cluster and, at each successive step, observations or clusters of observations are merged into fewer and fewer "natural groupings" (Norusis, 1994: 100). Although there is no objective way of choosing an optimum number of groups, the decision is usually guided by substantial increases in the measure of proximity (i.e. loss of homogeneity within groups). In this study a set of $n = 38$ cases or households was analysed across $p=4$ variables (the symptoms of poverty shown in Table 6).

3.3.3 Linear discriminant analysis (LDA)

A linear discriminant model is postulated to isolate and rank possible causes of poverty associated with groups of households displaying different symptoms of poverty. Linear discriminant analysis is a technique to statistically distinguish between two or more groups using a set of discriminating (explanatory) variables. The objective of LDA is to form weighted linear combinations of explanatory variables that are selected to force the groups to be as statistically distinct as possible:

$$LDi = b\,i\,1X1 + b\,i\,2X2 + \ldots + b\,i\,m\,Xm$$

where LD i = score on the ith discriminant function

i = 1...m

X1...Xm = standardized independent variables

$a_{i1} \ldots a_{im}$ = coefficients to be estimated

The potential number of functions is equal to the number of discriminating variables or equal to one less than the number of groups, whichever is smaller. There are three measures of the importance of discriminant functions. The first is the function's Eigen value relative to the sum of the Eigen values, which represents the total variance in the discriminating variables. The second is the canonical correlation or proportion of variance in the discriminant function explained by the groups. The last criterion for identifying significant functions is Wilks' Lambda. This is an inverse measure of discriminating power. Thus, the smaller the value of Wilks' Lambda the better the discriminating power of the estimated function (Klecka, 1975: 437).

The statistical theory of dicriminant analysis assumes that the discriminant function scores are normally distributed for each group and that the discriminating variables have equal variance-covariance matrices within each group. In practice these conditions are seldom applied strictly as the technique is very robust (Klecka, 1975:436). In this study the discriminant analysis is intended to identify associations (rather than explicit causal relationships) between possible causes of poverty and groups of households facing different levels and types of poverty.

CHAPTER 4
RESULTS

This chapter presents emprical analyses conducted on data collected in the census survey. Section 4.1 deals with a Principal Component Analysis of variables measuring housing quality. Section 4.2 describes a Cluster Analysis that groups households with similar poverty profiles. Lastly, section 4.3 presents a Linear Discriminant Analysis distinguishing between groups of households with different poverty profiles.

4.1 PRINCIPAL COMPONENT ANALYSIS

The results of the PCA are shown in Table 8. Bartlett's Sphericity test was significant indicating that the variables Walls, Water and Sanitation are correlated. Only the first principal component (PC_1) had an eigen value greater than unity. This component explained 45.5 percent of the total variation in the three variables. The loadings in PC_1 all carry positive signs showing that a change in one variable will be accompanied by similar changes in the other two, i.e. better sanitation is associated with better quality water and building materials. The first principal component was therefore used to compute scores for a composite variable interpreted as a positive index of a better standard of housing.

Table 8: Principal component analysis of housing attributes

Variable	Loadings for PC_1
Sanitation	0.40
Water	0.81
Walls	0.65
Eigen value	1.37
Percentage variance accounted for	45.5

Source: Shinns & Lyne, 2003.

4.2 CLUSTER ANALYSIS

The cluster analysis revealed five distinct natural groupings of households. The mean

distance within clusters increases markedly from 0.467 to 0.691 when the number of clusters diminishes from five to four indicating a sudden loss of homogeneity when fewer than five clusters are retained. Table 9 presents descriptive statistics computed for each cluster. These benchmarks could be used to track changes in both the level and distribution of poverty over time. It is clear that the clusters identify different dimensions of poverty.

According to Table 9, Cluster 1 contains households that have relatively higher incomes and wealth. Households in Cluster 2 are relatively asset rich but income poor, whereas those in Cluster 3 are relatively asset poor but income rich. Clusters 4 and 5 represent households poor in both income and assets, but households in Cluster 4 have better health and housing than those in Cluster 5.

Table 9: Cluster membership and characteristics, *n=38*

Cluster number	Cluster size (Hhlds)	Household numbers	Income per A.E. (R/Mth)	Livestock per A.E. (Rands)	Household members sick per A.E.	Standard of housing index
1	7	3,7,11,12,17,18 & 23	328.77	3361.29	0.000	-0.487
2	11	1,5,10,14,15,16, 20,26,31,33 & 37	116.89	4502.13	0.075	0.185
3	11	4,6,13,19,22,24, 27,28,35,36 & 38	367.93	911.15	0.094	-0.516
4	4	2,8,30 & 32	110.67	1899.46	0.091	2.062
5	5	9,21,25,29 & 34	77.96	1404.26	0.563	-0.237
Overall mean			219.92	2570.90	0.133	0.000
F-value for different means			6.48**	3.92**	6.24**	11.01**

Note: ** Denotes statistically significant at the 1% level of probability

A.E. = Adult Equivalent

Source: Shinns & Lyne, 2003.

4.2.1 Income and asset "rich" households

Cluster 1 gathers households characterised by relatively higher incomes and wealth amongst the groups. These (seven) cases account for just 18 percent of the households at Clipstone. The mean monthly income per adult equivalent (R329) is similar to that of Cluster 3, but almost three times greater than that of Cluster 2 – the group with the next highest income. The mean value of livestock per adult equivalent (R3361) is surpassed only by Cluster 2 and is almost 80 percent higher than that of Cluster 4 – the next wealthiest. Despite their relative wealth, households in Cluster 1 are poor in absolute terms. The mean monthly income per adult equivalent falls short of the 2001 poverty datum line (R353) for rural South Africa (Development Resources Centre, 2001) and the average household income (R1060 per month) is less than a quarter of the inflation adjusted national estimate (R4556) for the year 2000 (South African Data Profile, 2002). Although healthy, households in Cluster 1 have relatively poor housing. It seems that not even Clipstone's wealthier households can afford to invest in both housing and cattle.

4.2.2 Asset "rich" but income poor households

Cluster 2, representing 29 percent of the Clipstone community, accounts for households with low incomes but relatively high asset wealth. The mean monthly income per adult equivalent (R117) is approximately one-third that of Clusters 1 and 3 - the highest income groups. On the other hand Cluster 2 has, by far, the highest mean value of livestock per adult equivalent (R4502). It also has the second highest score on the housing index (0.185). However, this score is very low relative to the highest mean (2.062 for Cluster 4) reinforcing the view that even Clipstone's "wealthy" households are unable to invest in both livestock and quality housing.

4.2.3 Income "rich" but asset poor households

Cluster 3, also representing 29 percent of the community, contains households with low asset wealth but the highest incomes. Average household income (R1430 per month) exceeds the poverty line (R1278) estimated for South Africa in 2002 (City Press, 2002) but falls far short of the national average income (R4556) estimated for 2000 (South African Data Profile, 2002). The mean value of livestock per adult equivalent (R911) is well below the market price of a large stock unit highlighting the fact that 35 percent of households in Cluster 3 own no cattle at all. In addition, Cluster 3 has the worst score on the housing index, and a relatively high incidence of morbidity. The anomaly of low asset wealth and poor health in households with "high" incomes is most likely explained by the importance of pensioners as a source of income in these households relative to those in Cluster 1.

4.2.4 Income and asset poor – households living in a state of chronic poverty

Clusters 4 and 5 both contain households with relatively low incomes and wealth. Households in Cluster 5 may be somewhat poorer than those in Cluster 4, but the real distinction between these clusters lies in their health and housing scores. Households in Cluster 5 have the worst health, and those in Cluster 4 have the best housing. Cluster 5, with 13 percent of all the households, represents households trapped in abject poverty. Constrained by low incomes, these households have not accumulated assets and appear to be unable to finance adequate nutrition (resulting in high morbidity). While households in Cluster 4 share the same burden of low incomes and wealth, this may not always have been the case. These households, representing almost ten percent of the community, may have joined the poorest in recent times following the loss of income and/or the liquidation of saleable assets. Their prospects for recovery may be reasonable (as in the case of temporary unemployment) or bleak (as in the case of losing a wage earner or pensioner).

In summary, Cluster 1 represents the least vulnerable of the poor households at Clipstone. These households also enjoy relatively good health - possibly a reflection of reliable nutrition and clothing standards afforded by a combination of their relatively high incomes and liquid livestock assets. Households in Cluster 2, although poor in terms of current cash income, are relatively wealthy in livestock and consequently better equipped to deal with adverse shocks than are households in Clusters 3,4 and 5. Households in Cluster 3 are very poor in terms of both livestock and housing, but benefit from pension earnings that distinguish them from their less fortunate neighbours in Clusters 4 and 5. The latter live in chronic poverty.

4.3 DISCRIMINANT ANALYSIS

Owing to the small sample size, discriminant analysis was applied only to pairs of groups: The first analysis distinguished between the "rich" (cluster 1) and "poor" (cluster 4 plus the five cases in cluster 5), while the second analysis examined the more subtle differences between the "asset rich" (cluster 2) and "income rich" (cluster 3). The following linear discriminant model was postulated to predict group membership in both instances:

D_i = f (Matric, Support, Transport, Female Head, Femininity Ratio, Pensioner Ratio, Dependency Ratio, Adult Equivalents)

Several of the possible causes of poverty listed in Table 7 were omitted from this model because they lacked variation or measured the same concept as one of the variables included in the model (for example, the variables English, Junior and Senior were highly correlated with Matric). Following the arguments presented in Chapter 1, the signs of the coefficients estimated for the discriminating variables in the first model ("rich" vs. "poor"

households) were expected to be positive for the variables Matric, Support and Transport, and negative for the variables Female Head, Femininity Ratio and Dependency Ratio. Ordinarily, pensioners would earn less than other adults, and households with high a Pensioner Ratio would be predictably poor, *ceteris paribus*. However, at Sherwood where most adults are unskilled and unemployment rates are very high, pensioners are viewed as income generators (rather than as dependants) and a large Pensioner Ratio is more likely to indicate "rich" households. Family size (Adult Equivalents) was included in the model as a control variable for the ratios.

The expected signs of the coefficients estimated for the discriminating variables in the second model ("asset rich" vs. "income rich") are more difficult to rationalise. Households that had accumulated higher levels of liquid assets (livestock) were considered to have benefited from higher incomes in the past, whereas those with relatively high current incomes but low livestock wealth had not. The variables Matric and Support were expected to bear positively on livestock wealth as these attributes would not have changed much over time. Conversely, Transport was expected to bear more positively on current income. Households with serviceable vehicles have better access to job markets, but current ownership does not imply past ownership and the vehicle may be a substitute for investment in cattle. The Pensioner Ratio was also expected to bear more positively on current earnings than on accumulated assets because observed pensions were paid by the state and not by the private sector. This suggests that pensioners were not high income earners before they retired. Households with Female Heads and with higher Femininity and Dependency Ratios are likely to have had higher incomes in the past (before losing adult male workers) and these variables were therefore expected to bear more negatively on current income than asset levels. Again, family size (Adult Equivalents) was included in

the model as a control variable for the ratios.

Univariate F-tests were used to check for significant differences between group means computed for each of the postulated discriminating variables and only those variables with F-values greater than or equal to unity (boldface in Table 10) were retained for analysis. Table 11 presents the results of the discriminant function analyses. Model 1 accounted for 16 of the 38 cases and Model 2 for the remaining 22 cases. Both models are statistically significant and both have good predictive ability with rates of correct classification ranging from 78 percent for the "rich" group up to 91 percent for the "income rich" group. Box's M-test did not detect significant differences between group variance-covariance matrices for either model, and the distribution of predicted discriminant function scores is approximately normal in all of the groups except the "poor" group where the distribution is negatively skewed (Figure 1).

The discriminating variables were fitted using a stepwise procedure (SPSS v11.5, 2002: 120 - 140), rejecting variables that were not statistically significant at the ten percent level of probability. Multicollinearity was not considered to be a problem as the lowest tolerance value for excluded variables was 0.81 in Model 1 and 0.54 in Model 2. Signs of the estimated coefficients are consistent with *a priori* expectations.

Two of the three discriminating variables analysed in Model 1 were retained. Their standardised coefficients are both significant at the five percent level of probability, of similar magnitude, and carry negative signs (Table 11). When related to the group centroids (positive for "rich" and negative for "poor"), it can be concluded that sample households with the lowest income and wealth per adult equivalent tend to be female-

headed and relatively large, and that these two variables are equally important determinants of the poorest households.

Table 10:Group means for postulated discriminating variables

	Model 1			Model 2		
	"Poor" (n=9)	"Rich" (n=7)	F-value	"Asset rich" (n=11)	"Income Rich" (n=11)	F-Value
Matric	0.049	0.036	0.066	**0.138**	**0.034**	**3.145***
Support	0.000	0.000	N/A	**0.091**	**0.000**	**1.000**
Transport	0.222	0.143	0.144	**0.000**	**0.091**	**1.000**
Female Head	**0.556**	**0.143**	**3.049***	0.364	0.364	0.000
FemininityRatio	0.517	0.610	0.749	0.503	0.600	0.726
Pensioner Ratio	0.091	0.179	0.457	**0.028**	**0.083**	**1.639**
Dependency Ratio	**2.558**	**1.262**	**1.402**	**2.456**	**1.185**	**3.696***
Adult Equivalents	**5.217**	**3.224**	**3.650***	**4.919**	**4.058**	**1.081**

Note: * denotes statistical significance at the 10% level of probability

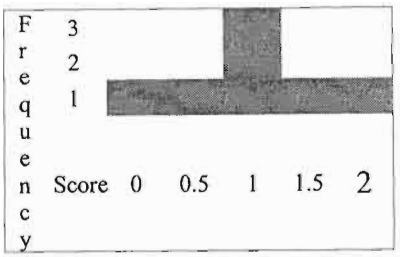
Source: Shinns and Lyne, 2005.

Table 11:Estimated discriminant functions

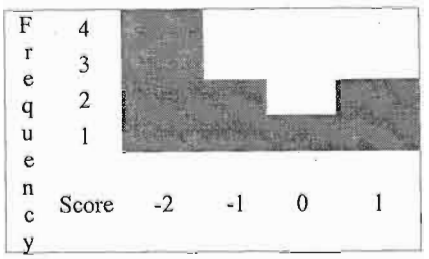
Discriminating variable	Model 1("rich vs. "poor")		Model 2 ("asset rich vs. "income rich")	
	Standardised coefficients		Standardised coefficients	
Matric			1.048***	
Transport			-0.641*	
Female head	-0.901**			
Pensioner ratio				
Dependency ratio			0.917***	
Adult equivalents	-0.936**			
Group	"rich"(n=9)	"poor" (n=7)	"asset rich" (n=11)	"income rich" (n=11)
Centroid	0.95	-0.74	0.91	-0.91
Correct Classification (%)	77.8%	85.7%	81.8%	90.9%
Overall Correct Classification (%)	81.3%		86.4%	
Wilk's Lambda	0.553**		0.524***	

Note:***, ** and * denote statistical significance at the 1%, 5% and 10% levels of probability respectively

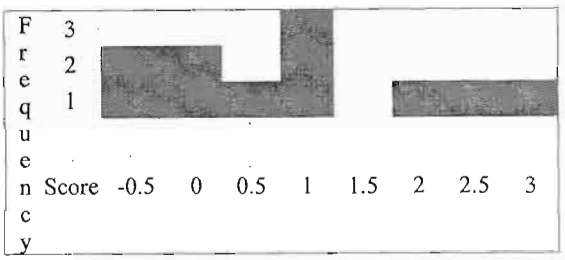
Source: Shinns and Lyne, 2005.



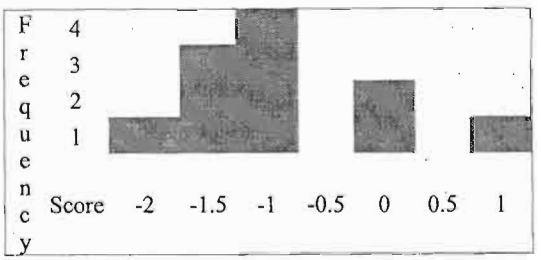
Panel (a) Model 1 "rich" (n=7)



Panel (b) Model 1 "poor" (n=9)



Panel (c) Model 2 "asset rich" (n=11)



Panel (d) Model 2 "income rich" (n=11)

Figure 1:Distribution of predicted discriminant scores by group

Source: Shinns and Lyne, 2005.

In Model 2, three of the six discriminating variables analysed were retained. The standardised coefficients estimated for Matric and Dependency Ratio were positive, of similar magnitude and statistically significant at the one percent level of probability. The third variable, Transport, has a smaller absolute coefficient and carries a negative sign. When related to the group centroids (positive for "asset rich" and negative for "income rich"), it can be concluded that sample households possessing more livestock (a liquid store of wealth) tend to have more educated adults whereas those with less livestock but higher current incomes tend to own serviceable vehicles and have fewer dependants per worker.

POLICY IMPLICATIONS

The cluster analysis of households at Clipstone revealed dimensions of poverty that help to identify short-term strategies needed to relieve the symptoms of poverty, and longer-term policies required to build assets that make households more resistant to poverty traps. The subsequent discriminant analysis of households with different poverty profiles sheds more light on the underlying causes of poverty and ways in which these fundamentals can be addressed.

With regard to short-term strategies, it is clear that state pensions are keeping about one-third of Clipstone's households (mostly in Cluster 3) out of chronic poverty. Unfortunately, pension payments will become less and less effective at alleviating poverty over the next two decades. At present, only 12 percent of Clipstone's population is older than 45 years of age. Of these, 50 percent are already older than 60, suggesting a reduction in the number of pension earners in future years, and a worsening distribution of poverty as households in Cluster 3 become poorer.

The anticipated decline in life expectancy due to HIV/AIDS will not only reduce future pension earnings but also the productivity of household labour. It is projected that by 2011 one in four working age adults will be infected with HIV, and that one in six will have succumbed to AIDS or related diseases (Development Resource Centre, 2001). On average, one-half of South African households could have a member infected with HIV, and about one-third could have lost an infected adult by the year 2011. These households will suffer diminished capacity to generate both future and current income and subsistence goods, and will incur additional costs caring for the sick. In terms of this study, these

problems are expected to shift more of Clipstone's households into Cluster 4, *ceteris paribus*.

Increasing the size of state pensions from their current monthly level of R600 will not assist the growing proportion of households devoid of members old enough to claim them, and lends some support to popular calls for a basic income grant (BIG) in South Africa. The proposed BIG (South African Council of Churches, 2001) recommends an income grant of R100 per month available to all South Africans. This approach avoids the cost of means testing applicants and encourages self-selection by those most needy, as the after-tax benefit would be small relative to transaction costs for wealthy households. According to the Development Resources Centre (2001), this BIG will nearly triple the average per capita income of poor households, from R46 to R120 per month, and close the average poverty gap by 80 percent for people in the bottom two income quintiles.

Table 12 shows the impact of the proposed BIG on the average monthly income (per adult equivalent) of households in each of the four poverty groups described in Chapter 4. For this community, the BIG would more than double the current earnings of households with the lowest incomes (groups 2 and 4). The largest improvement (180 percent) would be for households that are both income and asset poor. For wealthier households, some of the extra income may be used to accumulate savings and assets making them more resistant to adverse shocks and poverty traps. However, a study in the communal areas of rural KwaZulu-Natal (Hendriks and Lyne, 2003) estimates the expenditure elasticity for investment to be less than 0.5, even for the wealthiest decile.

Table12: Income effects of welfare grants on study households facing different dimensions of poverty

		Current situation	Proposed BIG	CSG extended to age 14	CSG extended to age 18
Poverty dimension	Poverty group	Mean household income per A.E. (R/Mth)			
Income and asset "rich"	1	329	483	348	355
Asset "rich' but income poor	2	117	251	148	160
Income "rich" but asset poor	3	368	497	376	391
Income and asset poor	4	93	309	155	182

Source: Shinns and Lyne, 2003.

A universal basic income grant that complements existing social security programmes will be expensive to implement and sustain due to sheer numbers of beneficiaries. At a monthly level of R100 per citizen, the grants alone would amount to approximately R44 billion per year. Individuals in the top three income quintiles of the population would capture one-half of this amount (Samson, 2002), but the middle and upper income earners would return a substantial part of the BIG through income taxes. Samson (2002) estimates the annual net cost of these grants at R24 billion. This estimate excludes administration costs. Prohibitive costs aside, a universal BIG poses formidable logistical problems in delivery, especially to poor people who are not employed, do not have bank accounts, live in remote areas and who may not have identity documents to prove their citizenship.

Extending existing child welfare grants might offer a more cost-effective way of relieving the symptoms of poverty. The child support grant (CSG) is a means tested grant of R140 per month presently available to children under the age of eleven. Recently the government announced its intention to extend the age of eligibility to fourteen. To qualify for a CSG, the child must have a South African identity number (i.e. a birth certificate or ID book) and the caregiver must produce an ID book with a bar-coded ID number, proof of income and

assets or an affidavit from a welfare officer declaring them to be unemployed. Assuming that all of the study households would satisfy these criteria, Table 12 shows that extending the age of eligibility to 14 will improve the earnings of low income households most, with the biggest gains accruing to households that are both income and asset poor (group 4). Indeed, for equivalent overall transfers, group 4 is targeted more effectively by the CSG than by the proposed BIG. Extending the age of eligibility for the CSG to 18 alters the level of gains but does not change their distribution much.

Extending the CSG would be logistically simpler than introducing an entirely new grant such as the proposed BIG. These findings support the government's recent decision to extend the CSG rather than introduce a BIG. Further savings could be achieved by offsetting the CSG against existing care dependency grants and foster care grants. Such savings might allow government to extend the CSG to children aged 18, so benefiting more poor households for a longer period of time and providing for disadvantaged children until they are old enough to complete their schooling. It must be noted, however, that the Clipstone community is very small and recommendations based on these findings will require further testing on a much broader front.

A school lunch programme also has advantages in that it dispenses with individual means testing and prevents beneficiaries from spending grants on non-essentials. However, Hendriks and Lyne (2003) estimate relatively low expenditure elasticities for alcohol and tobacco (0.78) relative to food (1.05), health (1.89), housing (1.65) and utilities (6.67) even amongst the wealthiest decile of poor households in rural KwaZulu-Natal.

With regard to longer-term strategies aimed at addressing the underlying causes of poverty,

the results of the cluster analysis lend support to programmes that seek to improve the distribution of wealth in South Africa. The land restitution and redistribution programmes should be consistent with this approach, but this is hardly the case at Clipstone where the poorest households have no livestock and consequently have not been able to benefit from the purchase of extensive grazing land that they cannot use, lease out or sell. These families could have benefited from dividends and capital gains had they been given the option of purchasing a smaller parcel of land for residential purposes and investing the balance of their land grants as equity in an existing commercial farm. Indeed, the SLAG programme has done little to enhance the day-to-day life of the poorest beneficiaries as it has not yet provided any new or improved services and infrastructure.

The discriminant analysis attempts to identify the fundamental causes of poverty by explaining differences between groups of study households with different poverty profiles. In the extreme case, where the objective was to distinguish sample households that had relatively high income and wealth from those with the least income and wealth, it was found that a distinction could be drawn using just two indicator variables; gender of the household head and family size. Larger, female-headed households have lower income and wealth per adult equivalent. In the second case, where the objective was to distinguish between sample households that had more wealth from those with less wealth but higher levels of current income, it was found that the "asset rich" had more human capital whereas the "income rich" owned vehicles and had fewer dependants per worker.

These results emphasise the importance of education and vocational training, especially for female members of the community. In the long run, increased levels of skills and education will improve access to jobs and thus the permanent incomes needed to accumulate assets.

Improving the employment prospects of women will also raise the opportunity cost of their time spent raising children, so increasing the demand for contraception (Fairlamb and Nieuwoudt, 1991) and slowing the spread of HIV. Upgrading the road infrastructure (in particular, access roads linking farms to district roads) and public transport services would also improve access to jobs and financial markets. Mobilising savings in the form of cash rather than cattle could improve access to credit and reduce pressure on grazing resources.

CONCLUSIONS

The broad objectives of this study were: firstly, to review literature in order to identify broadly accepted and measurable indicators of the possible causes of poverty and the resulting symptoms; secondly, to gather baseline information - including observations on poverty indicators - from a group of 38 households that recently benefited from government land reform grants to purchase Clipstone, a 630 hectare extensive grazing farm in the Midlands of KwaZulu-Natal; and thirdly, to undertake empirical analysis to assign households to two or more groups with different symptoms of poverty and to explain these differences in terms of their possible causes.

With regard to the symptoms of poverty it was found that households at Clipstone have different poverty profiles. Most (57.8 percent) are vulnerable to adverse shocks because they have either low incomes or low wealth. Some (23.6 percent) have low incomes and low wealth, and are living in chronic poverty. Pension payments still play an important role in alleviating the symptoms of poverty, but their effectiveness is diminishing because life expectancy is falling. While this problem lends support to recent calls for a universal basic income grant, prohibitive costs and logistical problems suggest that it would be more useful to extend the existing child support grant to include children up to the age of fourteen or even eighteen, partially replacing care dependency grants and foster care grants. In the longer term it is necessary to focus on asset accumulation. Contrary to expectations, the poorest households at Clipstone have not benefited much from their land grants as they do not own cattle. For them, investing part of their land grants as equity in a joint venture with a commercial farmer may have been a better option.

An obvious weakness of the study is that important causes of poverty relating to location, income shocks and institutional failures could not be investigated because the data were gathered at a single point in time from respondents living at the same location under the same institutional arrangements. Nevertheless, the results do shed some light on the dynamics of poverty and appropriate policy interventions. Poverty may be triggered by the loss of a male breadwinner. Household income falls immediately, especially if there are many dependants per remaining worker. Over time, this leads to asset de-accumulation if there are no, or few, other educated workers in the household. Some of these households become very dependent on social welfare grants for survival. In this rural sample, almost 30 percent of households fall into this vulnerable category where current incomes are relatively high but wealth is depleted. Vulnerable households that do not qualify for social welfare (say, following the death of a pensioner) may well slip into chronic poverty. Almost 25 percent of the sample households (mostly large, female-headed families) belong to this income and asset poor group.

With regard to the possible causes of poverty at Clipstone, the results emphasise the need for better job mobility to increase permanent incomes and the stock of household assets. This calls for improvements in education and vocational training for all members of the community and especially females; upgrading farm and access roads; and improving public transport to job markets and financial institutions. Improved access to financial institutions should encourage savings in the form of cash rather than cattle and so reduce pressure on the farm's grazing resources.

Lastly, it is concluded that the empirical results will facilitate comparisons of the level and distribution of poverty within the study community, and in the relative importance of

variables thought to explain poverty, when the same 38 households are panelled in future surveys. These changes will shed light on the welfare impacts of this land reform project.

SUMMARY

This dissertation reviews relevant poverty literature, starting with a widely-accepted definition of poverty and then discussing and distinguishing the main symptoms and causes of poverty. Poverty levels in South Africa and, more specifically, in KwaZulu-Natal are outlined as an introduction to the different types of poverty indicators used worldwide. Empirical measures of poverty such as poverty lines based on income, unmet needs, and human capabilities are described with reference to their application in various regions and countries. Attention is then focused on poverty measurement studies undertaken in South Africa. These studies are contrasted with the approach adopted in this study.

At an empirical level, the study set out to gather data on poverty indicators from a group of 38 land reform beneficiaries in the Midlands of KwaZulu-Natal, and to identify causes of poverty explaining differences between subsets of these households that displayed different symptoms of poverty. Principal component analysis, cluster analysis and discriminant analysis were used to achieve this objective. Principal component analysis was used to construct an index of the standard of housing, which was then combined with variables measuring other symptoms of poverty (income, wealth and health) in a cluster analysis of the households.

The cluster analysis revealed four distinct groups of poverty; households relatively income and asset "rich", households relatively income "rich" but asset poor, households relatively asset "rich" but income poor and households with relatively low incomes and assets. Linear discriminant analysis was then used to distinguish (a) households that were relatively income and asset "rich" from those that were relatively income and asset poor, and (b)

households that were relatively income poor but asset "rich" from those relatively asset poor but income "rich". In the first case it was found that "rich" households could be distinguished from poor households using just two indicator variables; gender of the household head and family size. Larger, female-headed households have lower income and wealth per adult equivalent. In the second analysis, it was found that the asset "rich" had more human capital whereas the income "rich" owned vehicles and had fewer dependants per worker.

The results of the cluster analysis therefore revealed that while income is an important indicator of current poverty, household wealth (measured in terms of saleable assets) indicates ability to cope with adverse shocks – a key issue as life expectancy is declining and old-age pensioners account for a large share of household income in the survey group. For the short run, it was concluded that child welfare grants should be increased because life expectancy is declining and pension earnings are therefore becoming less effective at combating the symptoms of poverty.

The results of the discriminant analysis suggest that long run policies should improve education and vocational training – especially for women – and upgrade road infrastructure and transport services to provide better access to jobs and banking facilities (to mobilise savings). These interventions are also expected to reduce the demand for children, increasing the demand for contraception and slowing the premature loss of breadwinners through HIV.

LITERATURE CITED

ADAMS, R.H. & HE, J.J. (1995). *Sources of income inequality and poverty in rural Pakistan.* International Food Policy Research Institute, Research Report 102, Washington D.C., USA.

ALIBER, M. (2001). Study of the incidence and nature of chronic poverty and development policy in South Africa: an overview. Unpublished paper, Programme for Land and Agrarian Studies, University of the Western Cape, Cape Town, South Africa.

ANNAN, N. (2002). Towards a sustainable future, The American Museum of Natural History's Annual Environmental Lecture presented at the World Summit on Sustainable Development, Johannesburg, South Africa.

ARDINGTON, E. (1980). Rural towns and basic needs. Center for Social and Development Studies Working Paper No. 20, University of Natal, Durban, South Africa.

ARDINGTON, E. (1988). Nkandla revisited: a longitudinal study of the strategies adopted to alleviate poverty in a rural community. Rural Urban Studies Unit, Centre for Social and Development Studies, Working Paper No. 16, University of Natal, Durban, South Africa.

BERRY, S. (1993). *No condition is permanent: The social dynamics of agrarian change in sub-Saharan Africa.* The University of Wisconsin Press, Wisconsin, USA.

BOOKER, W., SINGH, P. & SAVANE, L. (1980). Household survey experience in Africa. World Bank LSMS Working Paper No. 6, Washington, D.C., USA.

BREW, J. (2002). South African housing for the urban poor. African News Service – Bulletin d'information Africaine (ANB-BIA) Supplement, Issue/Edition No. 430, Brussels, Belgium.

BUREAU OF MARKET RESEARCH. (1995). *South Africa's 9 provinces: A socio economic profile.* Research Report No. 221, University of South Africa, Pretoria.

CASTILLO-SALGADO, C., SCHNEIDER, C., LOYOLA, E., MUJICA, O., ROCA, A. & YERG, T. (2001). Measuring health inequalities: Gini coefficient and concentration index. *Epidemiological Bulletin*, Volume. 22, No. 1, Pan American Health Organization, USA.

CITY PRESS. (2002). Half of SA live in poverty. Article published in City Press newspaper, 3 November 2002, South Africa.

CSS. (1995). *Provincial statistics part 5 Kwazulu Natal.* Central Statistical Services Report No. 00-90-05, Pretoria, South Africa.

CSS. (1996). *Statistics in brief.* Central Statistical Services, Pretoria, South Africa.

DAULTRY, S. (1976). *Concepts and techniques in modern geography.* Geo Abstracts, No. 8, University of East Anglia, UK.

DEPARTMENT OF LAND AFFAIRS. (2001). Grants and services of the land reform programe. Version 7. Pretoria, South Africa.

DEVELOPMENT RESOURCES CENTRE. (2001). *South Africans for a basic income grant.* A Report by the Development Resources Centre, Johannesburg, South Africa.

FAIRLAMB, C.D. & NIEUWOUDT, W.L. (1991). Economic factors affecting human fertility in the developing areas of Southern Africa. *Agricultural Economics*, Volume 6: 185-200.

FERGAY, N. (1998). Arab economies are failing the test: poverty is growing. *Economic Research Forum*, Volume. 5, No. 1, Cairo, Egypt.

GHAI, D.P., KHAN, A.R., LEE, E.L.H., & ALFTHAN, T. (1977). *The basic needs approach to development, some issues regarding concepts and methodology.* International Labor Organization Report on Employment, Growth and Basic Needs, Geneva, Switzerland.

GROOTAERT, C. & KANBUR, R. (1990). *Policy orientated analysis of poverty and social dimensions of structural adjustment, a methodology and proposed application to Cote d'Ivoire.* Social Dimensions of Adjustment in Sub-Saharan Africa, World Bank, Washington, D.C., USA.

GROSH, M. & GLEWWE, P. (1993). *Using nationally representative household surveys for food policy analysis: an examination of the world banks living standards measurement surveys.* Data Needs for Food Policy in Developing Countries, New Directions for Household Surveys, International Food Policy Research Institute, Washington D.C., USA.

GROSH, M. & GLEWWE, P. (1995). A guide to living standards surveys and their data sets. World Bank LSMS Working Paper No. 120, Washington, D.C., USA.

HAIR, J.F., ANDERSON, R.E., TATHAM, R.L. & BLACK, W.C. (1998). *Multivariate data analysis,* 5th ed. New Jersey, Prentice Hall, USA.

HENDRIKS, S. & LYNE, M. (2003). Expenditure patterns and elasticities of rural households sampled in two communal areas of KwaZulu-Natal. *Development Southern Africa, Volume.* 20, No. 1: 105-127.

JOHNSON, B.F & CLARK, W.C. (1982). *Redesigning rural development: a strategic perspective.* Johns Hopkins University Press, USA.

KASRILS, R. (2002). Developing countries take initiative to broaden access to water and sanitation. World Summit on Sustainable Development, Johannesburg, South Africa.

KHANDKER, S. (2001). *Poverty manual.* World Bank, Washington D.C., USA. Visited online July 2002 - http://www.worldbank.org/wbi/povertyanalysis/manual/#ar

KLECKA, W.R. (1975). *Discriminant analysis.* Statistical Package for the Social Sciences (SPSS). McGraw Hill, New York, USA.

LEIBBRANDT, M. & WOOLARD, I. (1999). A comparison of poverty in South Africa's nine provinces. *Development Southern Africa*, Volume. 16, No. 1: 37-54, South Africa

LEWIS, J.D. (2000) The Macro Implications of HIV/AIDS in South Africa: A preliminary assessment. Unpublished World Bank Paper AFTMI, Washington D.C., USA.

LITTLE, P. D. (2001). Asset cycles and livelihoods – addressing food insecurity in the Horn of Africa and Central America. Unpublished report, Institute for Developing Anthropology, University of Kentucky, Lexington, USA.

LITTLE, P.D. (2002). Building assets for sustainable recovery and food security. Basis Brief, No. 5, University of Wisconsin-Madison, USA.

MAY, J. & POSEL, D. (1992). Land reform research phase 1, prospects for land reform, provincial overview, KwaZulu-Natal. Center for Social and Development Studies Working Paper No. 24, University of Natal, Durban, South Africa.

MAY, J., CARTER, M. & POSEL, D. (1995). The composition and persistence of poverty in rural South Africa, an entitlements approach to poverty. Land and Agriculture Policy Centre, Policy Paper No. 14, Johannesburg, South Africa.

MAY, J. (1998). Report prepared for the office of the executive deputy president and the interministerial committee for poverty and inequality, poverty and inequality. Centre for social Development Studies, University of Natal, Durban, South Africa.

MAY, J., CARTER, M.R., HADDAD, L. & MALUCCIO, J. (2000). KwaZulu-Natal Income Dynamics Study (KIDS), 1993-1998: A longitudinal household data set for South African policy analysis. *Development Southern Africa* Volume. 17, No. 4: 567-581, South Africa.

NARAYAN, D & PRITCHETT, L. (1997). *Cents and sociability: Household income and social capital in rural Tanzania.* Social Development and Development Research Group, Policy Research Paper No. 1796, World Bank, Washington, DC., USA.

NGWANE, A., YADAVALLI, V. & STEFFENS, F. (2001). Poverty in South Africa – a statistical analysis. *Development Southern Africa,* Volume. 18, No. 2: 201-215, South Africa.

NORUSIS, M.J. (1994). *SPSS professional statistics 6.1.* SPSS Inc, Chicago, USA.

RAVALLION, M. (1996). Poverty lines in theory and practice, Living Standards Measurement Study. World Bank Working Paper No. 133, Washington, D.C., USA.

SAMSON, M. (2002). Research review on social security reform and the basic income grant for South Africa. Economic Policy Research Institute, Policy Report No. 31, University of Cape Town, South Africa.

SEN, A. (1981). *Poverty and famines, an essay on entitlement and deprivation.* Clarendon Press, Oxford, England.

SHINNS, L.H. & LYNE, M. (2003). Symptoms of poverty within a group of land reform beneficiaries in the Midlands of KwaZulu-Natal: Analysis and policy reccomendations. *Agrekon*, Volume. 43, No. 1: 74-88.

SHINNS, L.H. & LYNE, M. (2005). Possible causes of poverty within a group of land reform beneficiaries in the Midlands of KwaZulu-Natal: Analysis and policy recommendations. *Agrekon*, Volume. 44, No. 1, forthcoming.

SINGAPORE DEPARTMENT OF STATISTICS. (1999). Country paper on poverty measurement, the case of Singapore. Singapore.

SOUTH AFRICAN COUNCIL OF CHURCHES. (2001). South Africans for a Basic Income Grant: Platform. Unpublished report prepared by the Public Policy Liaison Office of the South African Council of Churches for Professor Vivienne Taylor, Head of the Committee of Inquiry into Comprehensive Social Security for South Africa, Cape Town, South Africa.

SOUTH AFRICAN DATA PROFILE. (2002). *World Development Indicators Database.* Visited online June 2002 - http://www.worldbank.org/data/countrydata/countrydata.html

SOUTH AFRICA INTEGRATED HOUSEHOLD SURVEY. (1999). Visited online May 2002 – http://www.worldbank.org/html/prdph/lsms/country/za94/za94home.html

SPSS v11.5. (2002). *SPSS* 11.5 *for Windows and Smart viewer.* SPSS Inc., Chicago.

STATISTICS CANADA. (2000). *Low income cut-offs.* Report by the Canadian Council on Social Development, Canada.

STRATEGIC PLANNING AND RESEARCH DEPARTMENT. (2001). *Gender, poverty and environmental indicators on African countries,* Volume. 2, African Development Bank, Tunis, Tunisia.

SWARTZ, L. (1996). Poverty, population dynamics and unemployment in South Africa with reference to four major racial groups. Unpublished UNDP Conference Paper, Department of Social Development, University of Pretoria, South Africa.

UNDP. (1997). *The framework for implementing the poverty assessment and strategy in Lebanon.* A Report by the United Nations Development Programme, Lebanon.

WHITE, H. & KILLICK, T. (2001). *African poverty at the millennium. Causes, complexities and challenges.* Strategic Partnership With Africa. World Bank, Washington D.C., USA.

WOOLARD, I. (2002). An overview of poverty and inequality in South Africa. Working Paper prepared for DFID (SA), South Africa.

WORLD BANK, (2000 a). *African Development Indicators 2000.* Visited online June 2002 - http://www.worldbank.org/data/countrydata/countrydata.html

WORLD BANK, (2000 b). *Measuring poverty at the country* level. Poverty Net Report. Visited online July 2002 – www.worldbank.org/poverty/mission/up2.htm

WORLD BANK, (2000 c). *Standardized Welfare Indicators, Africa Poverty Monitoring.* Visited online July 2002 - http://www4.worldbank.org/afr/poverty/measuring/Indicators/source_en.htm

WORLD BANK. (2001). *World Development Indicators*. Visited online July 2002 - www.worldbank.org/data/dataquery.html

WORLD DEVELOPMENT REPORT, (2000/2001). Causes of poverty and a framework for action. World Bank, Washington, D.C., USA.

Appendix 1:Household Questionnaire 2002 – Clipstone Farm

The information obtained in this questionnaire is strictly confidential and will be used for research purposes by LIMA staff and researchers at the School of Agricultural Sciences and Agribusiness, University of Natal. The findings will help the researchers to design a business plan that will give all households an opportunity to benefit from a livestock enterprise on Sherwood farm. Respondents do not have to answer questions, answers are voluntary.

DATE: _____ ENUMERATOR: _____

RESPONDENT'S NAME: _____

FAMILY NAME: _____

GROUP NUMBER: _____ HOUSEHOLD NUMBER: _____

PARTICIPATION LEVEL (COMPLETE/PARTIAL/NONE) _____

1. HOUSEHOLD DEMOGRAPHICS

	Household member (Including migrants who return daily or for weekends)	Relationship to head	Gender (M/F)	Age (Years)	Primary occupation[1]	Cattle owner (Yes/No)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

[1] Primary occupation categories: wage employed (**WE**); farmer (**F**); self-employed (**SE** – e.g. taxi driver, shopkeeper etc); housekeeper (**H**); pensioner (**P**) if in receipt of a pension; disabled (**D**) if in receipt of a disability grant; unemployed (**U**) if seeking work; scholar or student (**S**); infant (**I**) if too young to attend school; vagrant (**V**).

1.1 If the household head is a female is she widowed? (**Y** or **N**) _____

1.2 If the household head is a migrant or weekly commuter, who is the defacto household head (name)?

_____

1.3Is the defacto head single, married, widowed or separated? _____

1.2 HOUSEHOLD EDUCATION AND SKILL LEVELS

Do any of the household members who sleep at home have any form of education, training or skill?

Household member[1]	Ability to speak English (Yes/No)	Ability to write in Zulu (Yes/No)	Ability to write in English (Yes/No)	Ability to do written calculations (Yes/No)	Has...attended school (Yes/No)	If yes, level of schooling reached	Has...accounting skills or training (Yes/No)	Has...minute taking skills or training (Yes/No)	Has...cattle farming skills or training (Yes/No)

[1] Number corresponds to household member's name stated in table 1

1.3 HOUSEHOLD HEALTH AND NUTRITION STATUS

Household member[1]	Number of meals eaten by children yesterday	What was eaten for the main meal yesterday (Main ingredients to be stated)	Household member ill during the past month (Yes/No)	Number of times ill person visited a doctor/clinic in the past month	Where treated for illness[3]	Distance traveled to place of treatment (Kms)	Mode of transport used[4]	Time taken for the return journey (Hours)

[1] Number corresponds to household member's name stated in table 1
[2] Illness examples: cough; cold; diarrhea; toothache; injury due to accident; pregnancy
[3] Places where treatment can be carried out: on farm; on neighboring farm; in a town – Mooiriver; Howick; Currys Post; Pietermaritzburg
[4] Mode of transport examples: taxi; farmers' transport; bus

2 NON-FARM INCOME

Have any adult household members engaged in wage-work, earned a pension or received other welfare payments over the period Jan – April, 2002?

Household member[1]	Activity[2]	Cash income (Rands/month)	Cash remitted (R/month)	Disability and pension payments (R/month)	Who receives the remittance[1]
Total remittances since January					

[1] Number corresponds to household member's name stated in table 1
[2] Activity categories: pension; wage work; disability or child maintenance grant.

3 ENTERPRISE ACTIVITIES

An enterprise activity is one where the household member is self-employed. All enterprise activities undertaken by adult household members this year to be listed.

	Household member[1]	Activity[2]	Total income January – April 2002 (In Rands)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

[1] Number corresponds to household member's name stated in table 1
[2] Activities described as one of: taxi service; renting out rooms; hiring out contractor services; milling grain; baking; brewing or selling meals; building or repairing houses; block making; stone or metal work; making or repairing furniture; repairing vehicles and machinery; sewing or cobbling; shop keeping; hawking; handcrafts such as making and selling mats, baskets, pottery or curios; tanning and dying.

4 HOUSEHOLD ASSETS

4.1 FIXED ASSETS

Housing attributes	Response
Number of rooms in the house	
Material of house roof[1]	
Material of exterior house walls[2]	
Main source of drinking water[3]	
How long does it take to fetch water	
What kind of toilet does the house have[4]	
How far is this facility from the house	
Main source of energy[5]	
Approximate replacement value of house	
Was cash or credit used to buy or build the house	
If credit was used what was the source of credit	

[1] Roofing material categories: concrete (**1**); brick tiles (**2**); iron sheets (**3**); stone or slate (**4**); grass (**5**); tarpaulin or plastic sheets or branches and twigs (**6**)

[2] Exterior wall material categories: brick or stone with cement plaster (**1**); brick or stone with mud (**2**); timber (**3**); iron sheets (**4**); mud walls (**5**); tarpaulin or plastic sheets or branches and twigs (**6**)

[3] Drinking water categories: piped in House (**1**); public tap (**2**); tube well or borehole (**3**); protected well or spring (**4**); unprotected well or spring (**5**); pond, river or stream (**6**); tank, truck or vendor (**7**); other (**8**)

[4] Toilet facility categories: flush to sewage system (**1**); flush to septic tank (**2**); pour flush latrine (**3**); covered dry latrine (**4**); uncovered latrine (**5**); no facilities (**6**)

[5] Energy source categories: electricity (**1**); gas (**2**); paraffin (**3**); charcoal (**4**); purchased wood or sawdust (**5**); collected wood (**6**); dung (**7**)

4.2 MOVABLE ASSETS IN THE HOUSEHOLD

Key moveable assets	Number owned	Approximate resale price at present (Rands)	Paid off or still paying	Amounts still owing (Rands)
Bicycles				
Cars				
Bakkie				
Tractors				
Trucks				
Harrow/cultivator/plough				
Planter				
Maize mill				
Irrigation pumps				
Radios				
Television sets				
Electric or gas cooker				
Fridges or freezers				
Approximate equipment asset value				

4.3 SERVICES

	Distance to district road (Kms)	Distance to closest taxi or bus service (Kms)	Distance to closest shopping center with a bank (Kms)	Distance to the closest telephone (Kms)	Distance to the closest postal service (Km)	Distance to furthest school attended (Km)	Is the farm road ever impassable		
							often	sometimes	never
Time taken for a return trip (Hours)									
Mode of transport usually used [1]									
If taxi or bus service is used what is the cost (Rands									
How often does this service operate									

[1] Mode of transport examples: taxi; farmers' transport; bus

4.4 CREDIT AND CASH LOANS

What were the three largest loan or credit transactions (i.e. goods/services received before full payment was made) undertaken by any of the household members in the last year:

	Loan 1	Loan 2	Loan 3
Amount borrowed (Rands)			
Primary purpose of loan[1]			
Source of loan or credit[2]			

[1] Loan purpose categories: consumption (includes borrowing for food, social obligations and medical needs); education; purchase of durable goods; home construction or improvements; fixed improvements to farmland; purchase of farm inputs or equipment; purchase of non-farm inputs or equipment; purchase of land

[2] Credit or loan source categories: bank; seller; local money lender; friends or relatives; employer; savings club; government agency

4.5 SAVINGS

For each household member operating a bank account or holding a form of insurance policy please provide the following information:

	Household member[1]	Current level of savings (Rands) [2]	Type of policy	Monthly premiums on policy (Rands)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

[1] Number corresponds to household members name stated in table 1

[2] Score as: <R500; R501-R1000; R1001-R5000; R5001-100 00; R100 01-R500 00; don't know

4.6 LIVESTOCK REVENUE AND EXPENDITURE, 2001

Type of livestock owned by household	Number owned	Number sold last year	Distance to main point of sale (Km)	Number bought last year	Number born last year	Number slaughtered/ died/stolen/ otherwise lost last year	Estimated sale value of current stock (Rands)	Gross income from animal sales 2001	Gross income from animal product sales 2001
Bulls									
Oxen									
Cows									
Steer calves 0-12 months									
Steer calves 12-24 months									
Heifer calves 0-12 months									
Heifer calves 12-24 months									
Goats									
Pigs									
Horses									
Donkeys									
Total household 2002 estimated value of livestock									
Total household 2001 gross income from animal sales									
Total household 2001 gross income from animal product sales									

How many animals in total is the household allowed to graze? _____

Who decides how many animals each household is allowed to graze? _____

Is each household allowed to graze the same maximum number of animals? Yes/No _____

4.7 USE OF LIVESTOCK AND DISEASES WITHIN THE HEARD

Name the tree most important uses of your cattle from this list

_____ _____ _____

Ceremonies, dung (for fertilizer/flooring/fuel), cash from sales, lobola, milk, meat, ploughing, transport, skins

Have there been any problems with diseases in your livestock heards in the past year? Yes/No _____

If yes, what diseases occurred _____

What is done to prevent further diseases?

_____

_____

How much do you pay for this service? _____/livestock unit

How much do you spend on extra feed for your animals during winter?

_____/livestock unit

5 REACTION TO THE PROPOSED EQUITY-SHARE PROJECT

Would you like to participate as a shareholder (Yes/No)	Will you purchase shares for cash (Yes/No)	If yes, how much	Will you exchange livestock for shares (Yes/No)	If yes, how many	Specification of livestock[1]

[1] Livestock specification examples: bull; ox; cow; age

5.1 Name two members of the community you would nominate to serve on the Operating Company's Board of Directors _____

_____

5.2 What independent person outside of this community would you like to represent your interests on the Board of Directors?

_____

5.3 Who do you think the Directors should employ to manage the Company's herd?

_____