

M. Sc.

**LIVELIHOOD STRATEGIES AND THE PREVALENCE OF  
POVERTY IN RURAL MALAWI:  
The case of Central and Southern Malawi**

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MASTER THESIS 30 CREDITS 2010

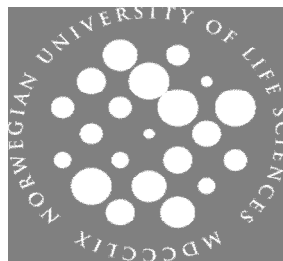




**Livelihood strategies and the prevalence of poverty in  
rural Malawi: the case of Central and Southern regions**

**Masters Thesis by**

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## **Dedication**

**To my parents Mr. Selestino Okullo and Mrs. Paskolina Okullo**

## **Acknowledgement**

**To the Lord Almighty who has guided and given me the strength to reach this level so far, be honored and glorified!**

To Professor Arild Angelsen, many thanks for your tireless efforts in guiding me through this work and in believing that I can do this. I feel so blessed to have had you as a supervisor and a friend too.

To the NOMA scholarship programme, thanks a bunch for the support and the exposure to the different extremes of life; the developing in the south and the developed in the North. I have learnt so much in the programme and I do not take it for granted.

To the Department of Economics, University of Life Sciences thanks for the support. To Dr. Olvar Bergland and Professor Stein Holden who took us through the class courses, thanks a lot too, they were of great help in writing this thesis.

To the Department of Agricultural Economics and Agribusiness, Makerere University, thanks for your guidance, support and Knowledge, that was indeed our first home. Special thanks also go to the Department of Economics at Bunda college of Malawi .

Am also indebted to Herbert Ainembabazi and Alex Tatwangire who were of great help in answering some of my questions and reading through the paper. To Rodney Runduka, thanks for your efforts in data collection, cleaning and editing.

To all the Ugandans in Aas, a big thumbs up, For God and My Country. To Ellena, Roar and Selah choir, you made my stay in Norway great. To all my Bunda friends, thumbs up for making my stay in Malawi great too.

Many thanks also go to my classmates, Sehin, Onesmus, Fitsum, Boja, Wubnesh, Tearme, Nina, Martha, Rui, Yeasmin, Min, Dewi. To Duncan, Thomas, and Henrikke who read and corrected my draft, it was of great help, thanks. To Isaac and Chiye who edited the paper, a big thanks to you too. To Wilson, you made a great academic colleague; from the econometric discussions at Makerere, to the energy classes at UMB, we never gave up. Glory to God!

Finally to my family; dad, mum, siblings and Ben thanks for your support. To my other friends, thanks for the support. Love you all.

# Table of Contents

DEDICATION.....	I
ACKNOWLEDGEMENT .....	II
TABLE OF CONTENTS.....	III
LIST OF TABLES.....	IV
LIST OF FIGURES.....	IV
ACRONYMS.....	V
ABSTRACT .....	VI
<b>1.0 INTRODUCTION .....</b>	<b>1</b>
<b>2.0 CONCEPTUAL FRAMEWORK.....</b>	<b>3</b>
2.1 THE SUSTAINABLE LIVELIHOOD CONCEPTUAL FRAMEWORK .....	4
2.2 POVERTY AND LIVELIHOOD STRATEGIES .....	11
2.3 HYPOTHESES .....	13
<b>3.0 METHODS.....</b>	<b>13</b>
3.1 PRINCIPAL COMPONENT ANALYSIS.....	14
3.2 CLUSTER ANALYSIS .....	15
3.3 POVERTY INDICATORS.....	16
3.4 ECONOMETRIC MODEL.....	18
4.0 STUDY AREA AND DATA .....	20
4.1 STUDY AREA.....	20
4.2 DATA SAMPLING, COLLECTION AND VARIABLES USED.....	21
<b>5.0 RESULTS AND DISCUSSION.....</b>	<b>26</b>
5.1 DESCRIPTIVE STATISTICS .....	27
5.1.1. <i>Asset distribution across income groups</i> .....	27
5.1.2. <i>Income and labor shares from the livelihood activities</i> .....	28
5.1.4 <i>Correlations of the Labor and Income shares</i> .....	30
5.1.3 <i>Welfare perceptions</i> .....	31
5.2. IDENTIFICATION OF LIVELIHOOD STRATEGIES .....	32
5.2.1. <i>Use of Labor shares</i> .....	32
5.2.2 USE OF INCOME SHARES.....	35
5.2.3 <i>Comparing the two approaches</i> .....	37
5.3 LIVELIHOOD OUTCOMES.....	38
5.3.1 INCOME DOMINANCE OF THE STRATEGIES.....	39
5.3.2 <i>Poverty prevalence?</i> .....	42
5.5 <i>Determinants of the Livelihood strategies</i> .....	43
<b>6.0 CONCLUSION AND IMPLICATIONS.....</b>	<b>49</b>
REFERENCES.....	53
APPENDIX 1: .....	57
APPENDIX 2: .....	59
APPENDIX 3.....	60

## List of Tables

Table 1: Number of Households sampled in the study .....	22
Table 2: Presents the variable names, their description and how they were measured.....	24
Table 3: Summary of Asset distribution across income categories .....	28
Table 4: Summary of percentage income shares from the different activities .....	29
Table 5: Summary of labor shares to the different activities by income quartile .....	30
Table 6: Correlation of the labor shares to the different activities.....	30
Table 7: Correlation of the net income shares to the different activities.....	31
Table 8: Summary of welfare perceptions across income groups .....	32
Table 9: Factorial Analysis based on labor shares .....	33
Table 10: Predicted factors scores from factorial analysis of the labor shares .....	33
Table 11: Clustering of the factor scores based on factorial analysis of the labor shares ..	34
Table 12: Factor loadings to the different activities (Net income shares).....	35
Table 13: Predicted factor scores following factorial analysis of the income shares .....	35
Table 14: Clustering of the factor scores based on factorial analysis of net income shares .....	37
Table 15: Summary statistics of households income groups participation in each strategy .....	39
Table 16: t tests of the per capita incomes from the three livelihood strategies .....	41
Table 17: The headcount, poverty gap and the Severity of poverty in the different livelihood strategies.....	43
Table 18: Multinomial Logit of Livelihood strategies: household size considered.....	45
Table 19: Multinomial Logit model of livelihood strategies; household labor considered .....	46
Table 20: Summary statistics of the variables used in the regression.....	57

## List of Figures

Figure 1: Sustainable Livelihood Framework of Analysis .....	6
Figure 2: the TIP Curves and Three Is of Poverty Source: (Jenkins and Lambert 1997)18	
Figure 3: Stochastic Income dominance between the livelihood strategies .....	40
Figure 4: Curves showing the Incidence, Inequality and Intensity of poverty in the strategies .....	42
Figure 5: Map of Malawi showing the study sites .....	59

## **Acronyms**

DFID Department for International Development

EA Enumeration Areas

IHS Integrated Household Survey

MK Malawi Kwacha

NSO National Statistical Office

TIP Three 'I's of Poverty (Incidence, Intensity and Inequality) of Poverty



## **Abstract**

*Rural households in developing countries like Malawi often take on a diversity of livelihood activities in an attempt to smooth consumption and improve on their general wellbeing. However, their choices to any of the livelihood strategies (combination of different livelihood activities) are conditioned by several factors ranging from asset endowment, geographical location and other exogenous factors like shocks. This paper identifies the livelihood strategies existing in Southern and Central Malawi using cross sectional data of 378 households. Subsequently, it looks at the factors limiting household's choices to particularly higher return livelihood strategies and the prevalence of poverty within these strategies. It uses the Sustainable Livelihoods framework for this analysis. Using factor and cluster analysis based on the labor shares, it identifies five distinct livelihood strategies. However, when factor and cluster analysis based on the net income shares are used, three livelihood strategies are identified. For other analysis, it adapts the livelihood strategies identified under income shares and finds that the forest and off farm worker strategy is inferior to the non farm business strategy and mixed livelihood strategy. The prevalence of poverty based on Foster Greer Thorbecke poverty indices and the Three I's of poverty also show that the forest and off farm worker strategy has the highest prevalence of poverty followed by the mixed strategy and lastly the non-farm business strategy. Using the multinomial logit model, the results indicate that the asset endowments particularly education, livestock units, labor, gender and district locations (Thyolo and Zomba districts in relation to Lilongwe) are crucial factors conditioning household's choices to livelihood strategies. Programmes aimed at poverty reduction should therefore be directed to the forest and off farm livelihood strategy. Additionally, policies such as education and distribution of the livestock assets become relevant for this subgroup. Of at most importance however, is the need to create a balance within the districts in terms of improved infrastructural access.*

**Key words:** *Livelihood strategies, poverty, factor analysis, cluster analysis, rural households*

## 1.0 Introduction

Poverty is one of the most pressing problems in Malawi. It has one of the highest population densities in the Sub Saharan Africa but with the lowest per capita income levels in the World (GovernmentofMalawi and WorldBank 2006). According to the Integrated Household Survey (IHS) of 2004/2005, 52.4 percent of the population lives below the poverty line (GovernmentofMalawi 2006). That is, about 6.3 million Malawians are poor, with the poorest people in the southern region, and the rural areas being poorer than urban areas (where poverty rates are at 25%) (GovernmentofMalawi 2006). The Poverty Monitoring System(PMS) (2000), suggests that in order to achieve maximum impact in reducing the poverty levels with the available resources, then the government should reduce the poverty gap from the bottom up. This implies that efforts should be directed towards raising the consumption of the poorest 10 percent of the poor rather than just raising the consumptions of any 10 percent of the households that are below the poverty line (Poverty Monitoring System(PMS) 2000). Identification and targeting therefore become very crucial aspects in any attempts towards poverty reduction.

In order to develop effective poverty reduction strategies, Chambers (1995) advocates for the understanding of the sustainable livelihood concept because it encompasses how the poor people live, what their realistic priorities are, and what can help them. May and Carter (1999), use Sen's entitlement approach which closely links poverty and deprivation in terms of the livelihood or claiming systems that map social and economic endowments into real consumption possibilities. Drawing from May and Carter(1999), the poor or vulnerable can be classified as those who share common income earning strategies or entitlement. Some studies have also used this approach in which rural households are grouped into subgroups based on the livelihood strategies they take on, and have then examined the factors that explain their choices to a particular livelihood strategy (Nkonya, Pender et al. 2004; Brown, Stephens et al. 2006; Babulo, Muys et al. 2008).

This paper adapts a similar approach. However, unlike the above papers that have either used the income approach or asset approach to map out livelihood strategies, this paper takes on two approaches (the income approach and the labor share approach) in an attempt to examine any similarities or differences of the two in the identification of livelihood strategies. Barrett and Webb (2001) mention three approaches to livelihood identification: First, the asset approach that involves mapping the assets of households to particular livelihoods. Second, the income approach that involves mapping the shares of income earned in different sectors of the rural economy to livelihood strategies. Third, the activity approach, in which activities which are *ex ante* flow of services map the stock concept of assets into the *ex post* flows of income. Each of them however, has its own shortcoming. The income approach is for example impacted by the stochastic, exogenous factors (Brown, Stephens et al. 2006). The asset approach has the limitation of being difficult to measure in rural economies in developing countries because secondary markets are poorly developed (Barrett et al., 2001). The activity approach on the other hand, is of no direct theoretical relevance and can likewise be difficult to measure (Brown, Stephens et al. 2006). Combining two or more of these approaches would therefore be more appropriate.

In addition, this paper combines both factor analysis and cluster analysis of the factor scores as methods in identifying distinct livelihoods. It then ranks them based on the stochastic incomes from the different strategies. Other literature have either used only factorial analysis of income shares or cluster analysis of household assets (Pender, Jagger et al. 2001b; Pender 2002; Nkonya, Pender et al. 2004; Brown, Stephens et al. 2006; Babulo, Muys et al. 2008). However, Jansen et al.(2006) note that a cluster analysis based on factor analysis usually results in a much clearer cut delineation of clusters than a stand-alone cluster analysis. Brown et al.(2006) also notes the importance of having clear boundaries between livelihood strategies before one considers graduation to better outcomes rather than improvement in performance of a given livelihood (higher productivity from the same basic choice, perhaps due to improved technical or allocative efficiency of practice or technological progress ).

Combining the above approaches and methods of livelihood identification with multinomial logit model, the paper's main objective is to identify major livelihood strategies in southern and central Malawi, determine the limiting factors to household's choices to higher return strategies and then determine the prevalence of poverty in each of the strategies. To attain these, the research uses the following research questions; which livelihood strategies emerge when labor shares to the different activities is considered? Which livelihood strategies emerge when net labor shares to the different activities is considered? Which livelihood strategy is superior to the others? Which factors limit household's choices to superior strategies? Which livelihood strategy has a higher prevalence of poverty? Answering these questions will provide useful insights as far as targeting of the beneficiaries of any poverty reduction programme or policy is concerned and will provide a step towards further research on using different approaches to livelihood identification.

The rest of the paper is organized as follows: Section 2 looks at the conceptual framework which mainly looks at the Sustainable Livelihoods framework. Section 3 looks the methods employed in the study. Section 4 presents the study area and the data used. Section 5 presents the results of the analysis and the discussion. Lastly, section 6 looks at the conclusion and implications of the study.

## **2.0 Conceptual framework**

Following Brown et al.(2006), I assume that a households seek to maximize their utility defined over stochastic income by allocating its given asset endowment across a set of feasible activities,  $i = 1 \dots N$ . A simple revealed preference argument then suggests that, where different asset endowments yield different income distributions that can be ordered in welfare terms (like via stochastic dominance criteria), any household observed to have adopted a lower return livelihood strategy may have faced a constraint that limited its choice relative to those of its neighbors. This is because no one would freely choose to draw from a stochastically dominated distribution when they had access to dominating alternatives.

In order to understand these choices to household livelihood strategies and the prevalence of poverty within these strategies, the study adapts the sustainable livelihood framework. The following terms are used through out this paper and henceforth, I provide their definitions;

Livelihood: this comprises of the capabilities, assets (natural, physical, human, financial, and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual (Ellis 2000)

Livelihood strategies: are the activities that generate the means of household survival (Carney 1998; Ellis 2000).

A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID 1999).

Livelihood portfolio; is a combination of activities that make up a livelihood strategy (Carney 1998).

Farm income refers to income generated from own account farming and will broadly include livestock and crops (Ellis 2000).

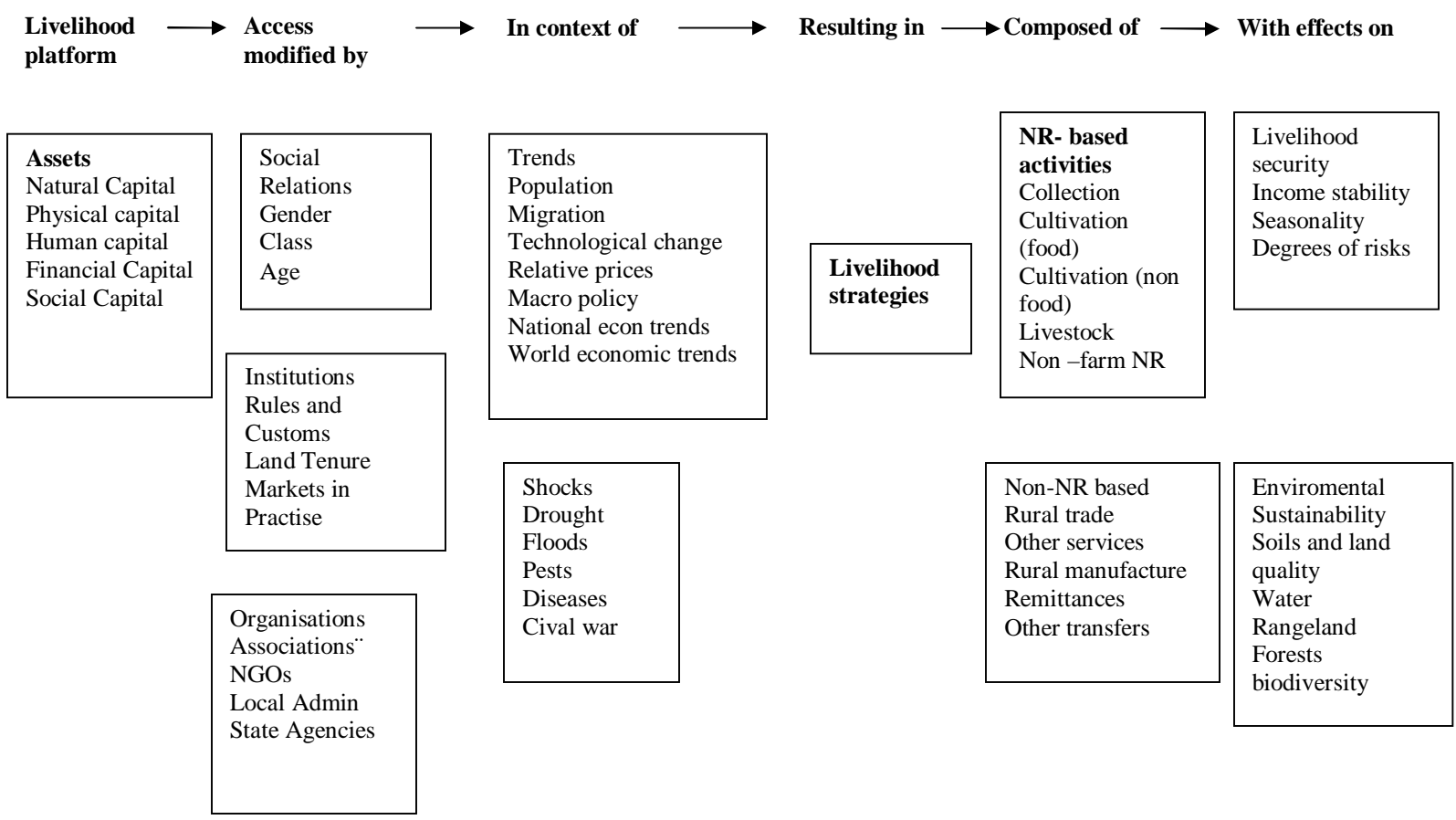
Off farm income refers to wages on other people's farms.

Non-farm income refers to non-farm income sources, usually consisting non-farm rural wage or salary employment and non-farm rural self employment sometimes called business income (Ellis 2000; Barrett and Webb 2001).

## **2.1 The Sustainable Livelihood Conceptual Framework**

This framework has been used in many livelihood studies in developing countries (Ellis 1999; Pender 2002; Angelsen and Wunder 2003; Brown, Stephens et al. 2006; Babulo, Muys et al. 2008; Van den Berg 2009). It involves understanding household's access to resources, diversity of livelihood strategies and the relevant factors at micro, intermediate and macro levels that influence the household's choices (Carney 1998; Ellis 2000; Adato and Meisen 2002).

This study particularly focuses on three aspects; livelihood platforms (assets), livelihood strategies and livelihood outcomes (See figure 1 provided in the next page). The livelihood strategies are determined by a combination of the livelihood assets whose access is modified by social relations, institutions and organizations, trends and shocks. Subsequently, the livelihood strategies taken up by households lead to livelihood outcomes which explain the overall status of the households in relation to poverty for example.



Source: (Ellis 2000)  
NR refers to Natural Resources

**Figure 1: Sustainable Livelihood Framework of Analysis**

### *Livelihood platform*

The starting point is the livelihood platforms which are the assets the households own, control, and claim and in some other means access. These form the basic building blocks upon which households are able to undertake production, engage in labor markets and participate in reciprocal exchanges with other households (Ellis 2000). Five different types of assets are usually considered when looking at the sustainable livelihood framework: physical capital, natural capital, human capital, financial capital and social capital. Other literature add on a sixth type of capital known as political capital (Adato and Meisen 2002; Angelsen and Wunder 2003). Natural capital includes assets embodied in natural resources such as land quality, land rights, access to forests and other biological resources that are used by people to generate means of survival. Physical capital includes buildings, roads, tools, machines, livestock and other household equipment. Human capital is capital that is embodied in people's knowledge and abilities such as education, experience and training. Social capital is capital embodied in social relations such as trust and participation in organizations or networks. Financial capital refers to liquid assets such as savings and access to credit.

The above assets are important to understanding household choices of various livelihood strategies. Natural capital will for example limit the household's choices towards some strategies because of the location (Rakodi 1999). Locations with fertile soils may favor crop production strategy while hilly and mountainous areas because of their rapid changes of gradient over short distances will allow for spatial diversity in livelihood niches (Ellis 2000). Forests or trees in a given location will represent a natural resource base in which the forest activities such as charcoal burning or forest wage work can take place. Such locations with endowment of natural resources will therefore have a comparative advantage as far as the costs and risks of producing different commodities are concerned and the opportunities for and the returns to alternative activities such as farm versus non-farm employment (Nkonya, Pender et al. 2004). Another important aspect of natural capital in developing countries is the land resource. Given labor endowments, most rural households that have insufficient land will tend to pursue off



farm work on others farms as a livelihood activity in addition to their on farm production (Barrett and Webb 2001). Also households with larger land size, may be induced to engage in crop production as a livelihood strategy and engage less in other activities especially in a developing country like Malawi where land markets may not be perfect (Babulo, Muys et al. 2008).

Access to physical capital will also have influence on the choice of livelihood strategies that households take on. Infrastructural access such as roads is vital to the choice of the livelihood strategy. Opportunities for rural non-farm activities are likely to be greater amongst households closer to urban markets and roads (Barrett and Webb 2001). These areas with access to markets and roads are also likely to be involved in the production of perishable high value crops such as horticultural crops which are more likely to be profitable (Nkonya, Pender et al. 2004). Additionally, employment in urban industries is also more likely to be greater for people close to the roads and in urban areas (Nkonya, Pender et al. 2004). Access to roads and urban markets may for example be a component of a location variable such as the district or village of origin. In Malawi, districts such as Lilongwe (capital city of Malawi) may therefore tend to have its households more involved in non-farm skilled work than their counterparts in other districts. Other physical assets of importance are the livestock endowment of the household.

Human capital affects the decisions of households and also affects their ability to access resources (Brown, Stephens et al. 2006). The number of people in a given household will for example increase the ability to diversify to other activities other than the farm work. Skills and educational attainment also serve as substantial entry barriers to high paying non-farm employment or self employment in Africa (Barrett and Webb 2001). Following the above therefore, small sized households will tend towards on farm livelihood strategy when compared to the larger sized households who can also engage in into non-farm activities. Additionally, female headed households are more likely to engage in informal activities such as producing and selling local beer or other food items (Babulo, Muys et al. 2008).

Other assets such as social and financial capitals are also important factors in the choice of a livelihood strategy. However, in developing countries, they usually tend to be endogenous (Nkonya, Pender et al. 2004). The credit market for example is often missing due to imperfections like high transaction costs in provision. To access credit therefore will often times be a function of household factors like land size and educational level (Nkonya, Pender et al. 2004).

### ***Mediating processes***

Mediating processes are contextual social, economic and policy considerations that influence access to assets and their use in pursuit of viable livelihoods. They include social relations, institutions, organizations and exogenous trends and shocks (Ellis 1999; Ellis 2000) (Refer to column 2 and 3 in figure 1). Social relations comprises of such factors like gender, caste, class, age, ethnicity and religion. Institutions are the formal rules, conventions and codes of behavior that comprise constraints human interaction (Ellis 2000). Organizations on the other hand are groups of individuals bound by some common purpose to achieve objectives and will include nongovernmental organizations, state agencies and local administration (Ellis 2000). Shocks which are listed as events in figure1 may include drought, floods, pests, diseases and civil war.

Social relations, institutions and organizations may inhibit or facilitate the exercise of capabilities and choices by individuals or households (Ellis 2000). Government policies programmes and institutions may for example attempt to promote certain livelihood strategies or indirectly, they may promote investments in other forms of physical, human or social capital that affect farmers' abilities and constraints (Pender 2002; Nkonya, Pender et al. 2004). An example is the subsidy programme in Malawi; through coupon distribution<sup>1</sup> may favor the tobacco and food crop livelihood strategies as compared to other livelihood strategies (Levy 2005). However, such social, institutional and organizational institutions

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<sup>1</sup> In Malawi, the coupon distribution is a government program in which coupons distributed to farmers are used to redempt fertilizers at input outlets at reduced costs

tend to be endogenous and dependent on other household factors like age of the household head, gender, educational level and land size.

### ***Livelihood strategies***

The livelihood strategies which forms the centre of this study and hence framework consists of activities which can be natural resource based or non natural resource based. Natural resource based activities will for example include the collection or gathering from woodlands and forests, food cultivation, non-food cultivation, livestock keeping and pastoralism and non-farm activities such as brick making, weaving, thatching and so on (Ellis 2000; Adato and Meisen 2002). Non natural resource based activities will include rural trade (marketing of farm outputs, inputs, and consumer goods), other rural services like vehicle repair, rural manufacture and remittances (Ellis 2000). Most households in rural Africa will take on multiple of these activities (Ellis 1999; Pender, Jagger et al. 2001b; Adato and Meisen 2002; Brown, Stephens et al. 2006). The constraining factors to the adaptation of these livelihood strategies are the assets the household owns as mentioned earlier.

### ***Livelihood outcomes***

The last column of the diagram represents the livelihood strategy outcomes. These outcomes are a result of the interaction of the household's five capital endowment and the mediating processes (Ellis 2000). These can be divided into livelihood security (income level, income stability, reduction in adverse seasonal effects and reduction in the overall risks profile of income) and environmental sustainability (changes in terms of the resilience and stability of resources such as soils, water, rangelands and forests) (Carney 1998; Ellis 2000). These livelihood outcomes may in turn help households become less or more vulnerable to manage or cope with shocks (Ellis 2000; Adato and Meisen 2002). Various research pay attention to different livelihood outcomes ranging from poverty reduction, more income, to sustainable use of natural resources (Carney 1998; DFID

1999; Ellis 2000; Nkonya, Pender et al. 2004) . In this paper, I investigate the prevalence and severity of poverty within each of the livelihood strategies identified.

## **2.2 Poverty and Livelihood strategies**

Following Chambers (1995), poverty is defined as a lack of physical necessities, assets and income. Poverty can be conceived in absolute or relative terms. In absolute terms, it is closely associated with the poverty line and can be defined as the proportion of the population that fall below some fixed measure that represents the minimum material necessities for healthy survival (poverty line) (Angelsen and Wunder 2003). Relative poverty on the other hand, is when a certain proportion of the population is viewed as poor based on for example a certain level of income, for example below the average income in the population (Angelsen and Wunder 2003). Proportions of the population can be viewed as being in relative poverty yet their consumption levels may be well above the minimum physiological needs of survival.

The prevalence of poverty can also be viewed as being chronic or transient(WorldBank 1996). Chronic poverty is that poverty in which households have a chronic incapacity to work and earn an income usually attributed to a physical or mental disability, long term illness or old age (WorldBank 1996; Owuor 2006). Transient poverty on the other hand, can be defined as that poverty in which households are temporarily unable to provide for themselves for example, as a result of loss of employment for example (Owuor 2006).

To measure the prevalence of poverty, the use of money metric methods has been criticized because of its failure to capture aspects such as access to safe water, adequate shelter which are better indicators of poverty and human possibility than are income or expenditure based dimensions(May and Carter 1999). Consequently, (May and Carter 1999)suggests that the use of livelihood strategies in which households are characterized by broadly similar relationships to property and means of production gives a better understanding of the structure of constraints that impinge the poor than the use of poverty headcounts for example. Following (May and Carter 1999)) and (Sen 1981) therefore, the

poor can be identified as those who share a common claiming strategies or entitlement. So the prevalence of poverty can be viewed as an outcome of the livelihood strategy that households take on which in turn depends on the asset endowment (both tangible and intangible) of the household. The livelihood strategy or “livelihood mapping”<sup>2</sup> (to borrow from (May and Carter 1999), provide a linkage between the asset endowments of the households and the accessible bundle of commodities that they can consume which is an indicator of the prevalence of poverty within that household. This linkage is made clearer in the conceptual and theoretical framework in the next section.

Literature also links some livelihood activities to poverty (Angelsen and Wunder 2003; Government of Malawi 2006; Government of Malawi and World Bank 2006). For example, a high dependence on certain forest products has been highly associated with poverty especially because other employment options are not usually available to households that take on this livelihood activity (Angelsen and Wunder 2003). Additionally, the poor are always attracted to non timber products which offer lower returns than timber products because of their low capital requirements and skills and open accessibility for extraction from the natural forests (Angelsen and Wunder 2003). This could be one of the reasons why they remain poor.

Barrett and Webb (2001) further notes that poorer households will often times hire themselves out to work on other people’s field or to herd other’s animals for low wages due to poor endowment of productive non labor assets. Further, farm and skilled non farm strategy (non-labor) tends to be associated with higher income households with relatively better educated or skilled adult members. Government of Malawi and World Bank (2006) also note that with respect to income diversification, the significant feature that distinguishes non poor households from poor households is the share of income obtained from wage employment, with this share for non poor households being 17.3 percent as compared to 13 percent for poor households in developing countries.

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<sup>2</sup> The two terms livelihood strategy and livelihood mapping may in a way be similar as they all lead to or imply livelihood outcomes but may equally be different as the former refers to activities and the latter refers to an outcome.

## 2.3 Hypotheses

Following the conceptual and theoretical framework and to answer the research questions, I hypothesize that;

1. There exist significant statistical differences in the per capita incomes of the identified livelihood strategies. Subsequently, the prevalence of poverty is not uniformly distributed among the different livelihood strategies.
2. Households with less endowment of assets particularly land, labor, education and livestock choose livelihood strategies that have lower returns.
3. The geographical location of the household determining market and resource access, are significant determinants of livelihood strategies besides the asset endowment of the household.

The first hypothesis seeks to establish if there are any differences in the per capita income levels of the livelihood strategies identified and therefore the prevalence of poverty within each of them. Following this, the livelihood strategies can then be ranked as superior or inferior to other livelihood strategies. The second hypothesis aims to find out if asset endowment (particularly, land, labor, education and livestock units) provides a key explanation to household's choice of demonstrably less superior livelihood strategies. In otherwise, when livelihoods are ranked in welfare basis, some group of the sub population may select less superior strategies because they are constrained in terms of their asset endowment as noted in the sustainable livelihood framework. The third hypothesis tries to establish if access to markets, institutions and other infrastructures which are a component of the location of an area could explain the choices of livelihood strategies that households take on.

## 3.0 Methods

To answer the research questions and the hypothesis made, I first identify the livelihood strategies based on factor and cluster analysis. Subsequently, I determine which strategy is superior to the others using stochastic dominance of the incomes and a combination of

TIP curves and Foster Greer Thorbecke (FGT) poverty indices. Lastly, I employ the multinomial logit model to determine factors that limit individuals from taking on superior strategies. I explain each of these methods employed in my analysis below.

### **3.1 Principal Component Analysis**

Factor analysis of which principal component analysis is an example is used extensively as a data analytic technique for examining patterns of interrelationship, data reduction, classification and description of data, data transformation and hypothesis testing (Rummel 1970). This technique involves transforming a set of observed variables into a new set of variables which are linear composites of the observed variables (Kim and Mueller 1978a). The new composites then account for the covariation and variation between and within variables. Ford et al. (1986) specify four major issues in using factorial analysis in any study. These are: the choice of the factor model to be used, the decision about the number of factors to be retained, the methods of rotation and the interpretation of the factor solution.

In this study, I use principal component analysis rather than the principal factor analysis. This is mainly because my objective is data reduction rather than studying the structure of the variables, which the latter does better (Ford, Robert et al. 1986). In the decision of the number of factors to retain, I use the most widely used criterion (Kaiser Criterion) to determine the factors to retain. This criterion involves retaining factors with Eigen values greater than one. However, because of the shortcomings of this method, one of them being retaining so many factors, I try to examine several solutions with more or fewer factors and choose the one that gives a clear cut delineation of the factors and the livelihood set. I also use the commonly used rotational method; the orthogonal rotation with Varimax (Ford, Robert et al. 1986).

Lastly, to interpret the results from the factor analysis, I use factor loadings as well as the predicted factor scores to define that factor. A variable with factor loadings greater than 0.40 and have high predicted factor scores compared to the other variables is considered significant and defines that factor. A variable that was for example significant to all

factors was assigned to that factor to which it had the highest loadings. In addition, I examine the pattern of high and low loadings (the signs) across the variables. This follows Ford et al., (1986), who point out that factor labels are more meaningful when they reflect what is as well as what is not involved in the factor.

This method is used to identify major livelihood strategies in Central and Southern Malawi. Net income shares and share of labor allocated to eight activities that are most likely to occur in Malawi is used for this analysis. These are: staple food crop cultivation (maize production), tobacco production (major cash crop), other agricultural crops (rice, groundnuts, vegetables) livestock rearing, forestry activities, casual labor on other people's farms commonly referred to as "ganyu" in Malawi, business involvement (enterprises) and lastly formal employment .

### **3.2 Cluster Analysis**

Cluster analysis is a statistical method for classification of observations into two or more mutually exclusive groups that makes no prior assumptions about the important differences in the population (Punj and Stewart 1983). This method splits observations into mutually exclusive groups such that observations within a given group are very homogenous but very different between groups. It has been widely used as a method of classification in various disciplines including marketing (Punj and Stewart 1983). Other livelihood studies have either cited or used it as a method of categorizing households into their distinct livelihood strategies (Barrett and Webb 2001; Brown, Stephens et al. 2006; Babulo, Muys et al. 2008). Babulo et al. (2008) use it to categorize households into distinct livelihoods based on the share of forest income in the total net income of the household while Brown et al.(2006) use it to categorize households into their distinct livelihood strategies based on their asset composition. This paper uses cluster analysis (Kmeans) of the factor scores from factorial analysis to group households into their distinct livelihood strategies. Jansen et al. (2006) note that a cluster analysis based on factor analysis usually results in a much more clear cut delineation of clusters than a standalone cluster analysis. Households are then grouped into those livelihood strategies for which the k-means in the clusters are positive.



### 3.3 Poverty Indicators

A number of methods can be used to measure poverty. These are the headcount index, poverty gap index and poverty gap squared index. These belong to a family of poverty measures known as the Foster Greer Thorbecke (FGT) poverty indices Foster et al. (1984) computationally given by equation 3.3.1 below:

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^N I \left( \frac{Z - Y_i}{Z} \right)^{\alpha} \dots\dots\dots(3.3.1)$$

Where  $\alpha$  is a non negative poverty aversion parameter;  $N$  is the sample size;  $Z$  is the income poverty line;  $Y_i$  is the income per adult equivalent; and  $I$  assumes the value of 1 for poor and 0 otherwise. When  $\alpha = 0$ , then it is a headcount index,  $\alpha = 1$ , it is the average normalized poverty gap and when  $\alpha = 2$ , the index measures the severity and acuteness of poverty.

The headcount index gives the proportion of the total population ( $N$ ) for whom consumption or income is less than the poverty line. Poverty gap index measures the amount of money required to raise the income of a poor person to the level of the poverty line. The poverty gap squared index measures the severity of poverty and is useful for comparing populations that have differing experiences with respect to the severity of poverty (Ravallion 1996). The headcount index is computationally easy, and gives an adequate measure of assessing the overall progress in reducing poverty. However, it has a shortcoming of ignoring the differences in the well being between different households by assuming that the poor are all in the same situation. It is also not sensitive to the changes in the well being of individuals for as long as they are below the poverty line. Lastly, it does not take into account the intensity of poverty.

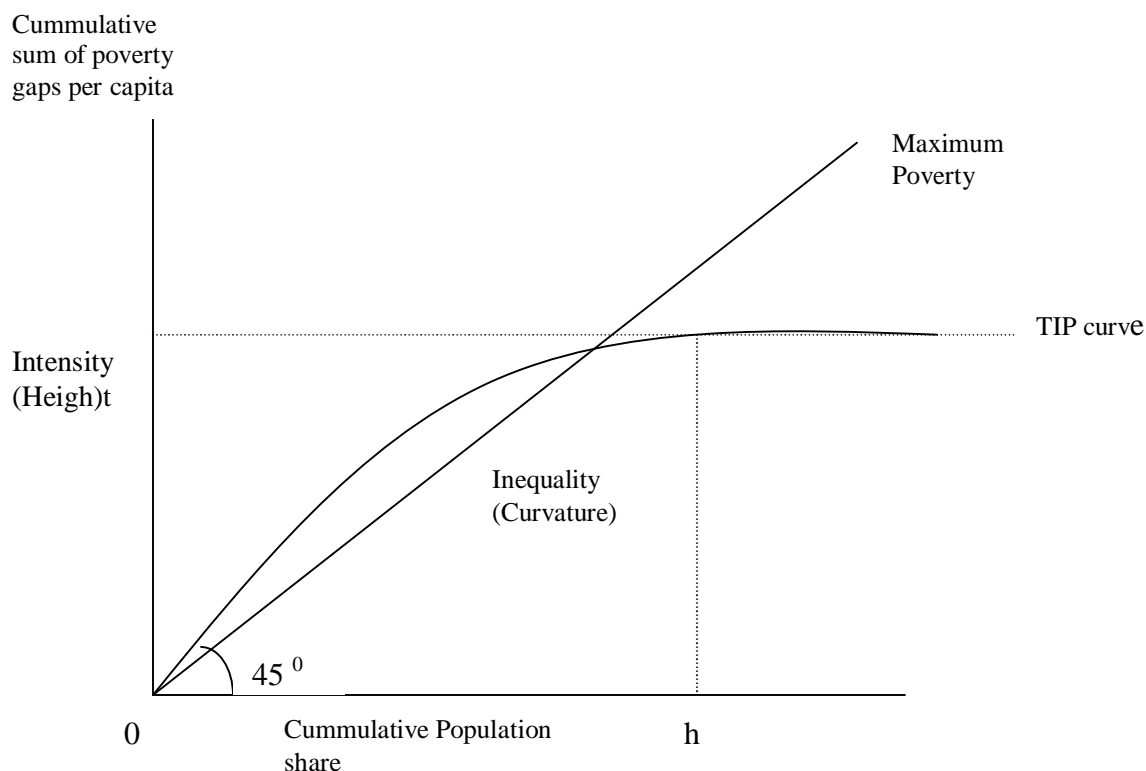
The poverty gap on the on the other hand, reflects the average shortfall of the poor, and gives a better understanding of poverty (Makoka and Kaplan 2005). However, it is has a shortcoming of not being able to capture the severity of poverty among the poor and ignores inequality among the poor themselves (Makoka and Kaplan 2005). The poverty

gap squared captures the differences in the income levels of the poor. It has the advantage of capturing both the poverty gap and the inequality among the poor.

I also use the Three I's of poverty (TIP) curves to determine the prevalence of poverty among the livelihood strategies. Following Jenkins and Lambert (1997), the TIP curves simultaneously portray the incidence, intensity and inequality dimensions of aggregate poverty. It is a plot obtained by ranking people from the poorest to the richest and then cumulating their poverty gaps (Jenkins and Lambert 1997). The accumulation of the poverty gaps is then on the vertical axis while the population share is on the horizontal axis and the curve is an increasing concave function (Jenkins and Lambert 1997). The slope of the curve at a given percentile is equal to the poverty gap for that percentile. The curve becomes horizontal at all population shares corresponding to income at or above the poverty line (Jenkins and Lambert 1997).

The incidence dimension of poverty is depicted by the horizontal distance from the origin to the point where the TIP curve becomes a horizontal line while the intensity dimension is depicted by the vertical distance from the origin to the point where the TIP curve becomes a horizontal line. The inequality dimension of poverty is captured by the degree of the curvature of the TIP curve before it gets horizontal (Jenkins and Lambert 1997). In the extreme case of maximum poverty where each person in the population has an income of zero, the TIP curve is a straight line at angle of 45 degrees from the origin and in the other extreme case where no one is poor, the TIP curve coincides to the horizontal axis (Jenkins and Lambert 1997).

For one strategy to have a higher prevalence of poverty than the other, its TIP curve should lie wholly above the TIP curve of other (Jenkins and Lambert 1997). For incidences where two TIP curves intersect before they become horizontal, the one which was initially dominant and has a higher FGT (2) index has a higher prevalence of poverty in that share of the population where the intersection is.



**Figure 2: the TIP Curves and Three Is of Poverty Source: (Jenkins and Lambert 1997)**

### 3.4 Econometric model

I use the random utility model to study household's choices to the various livelihood strategies. The random utility model is used to study choices among discrete alternatives, such as the choice of the transportation mode and where to shop from (Haab and Hicks 1977). It incorporates uncertainty onto the utility function. For example the utility that an individual  $i$  is associated with an alternative livelihood strategy  $j$  is given by

$$U_{ij} = \beta' X_{ij} + v_{ij} \quad (3.4.1)$$

Where  $\beta' X_{ij}$  is the deterministic part of the model,  $v_{ij}$  is the non deterministic part (random) and  $U_{ij}$  is the utility derived by the  $i$ -th individual from choosing the  $j$ -th livelihood option. If he chooses option  $k$ , it means that  $U_{ik} > U_{ij}$  for all  $j \neq k$ . This

requires independence of disturbances between choices (Manski 1977). The independence of irrelevant alternatives requires that the introduction of an irrelevant alternative should have no impact on the relative probabilities of choosing among the relevant alternatives (Haab and Hicks 1977).

I use the multinomial logit model to explain these choices of livelihood strategies in terms of characteristics specific to households. The dependent variable is polychotomous variable since there exists more than two livelihood strategies. One major drawback of the logic model is the desire for the independence of irrelevant alternatives. It has however been used elsewhere in many livelihood studies. Barrett et al.(2001) and Brown et al.(2006) use it to find the determinants of livelihood strategies in Kenya. Nkonya et al.(2004) use it to find the determinants of livelihood strategies in Uganda. Babulo et al.(2008) use it to find the determinants of livelihood strategies in the Tigray region of Ethiopia.

So it follows that given  $J + 1$  choices, 0, 1, 2,..... $J$ , the probability of an individual  $i$  choosing site  $j$  from those choices is modeled as in equation (3.4.2)

$$P_i(j) = p(j / j \in S, X_i) \dots\dots\dots (3.4.2).$$

$X$  is a vector of household specific characteristics . In the case of multinomial logit, this is written as in equation (3.4.3) and equation (3.4.4)

$$Pr ob(y_i = j) = \frac{e^{\beta_j X_i}}{1 + \sum_{k=1}^J e^{\beta_k X_i}} \text{ for } j=1, 2, \dots, J \dots\dots\dots(3.4.3)$$

$$\text{and } Pr ob(y_i = 0) = \frac{1}{1 + \sum_{k=1}^J e^{\beta_k X_i}} \dots\dots\dots(3.4.4)$$

Estimation is by maximum likelihood.

## **4.0 Study area and data**

This section briefly looks at the background of Malawi as the area of study and reviews how the respondents were sampled, how data was collected and what information was collected.

### **4.1 Study area**

The study was carried out in Malawi. Malawi is a small landlocked country located in Southern Africa. It is bordered to the north by Tanzania, Mozambique to the east, south and southwest and Zambia to the west. It is one of the highest populated countries in sub Saharan Africa, and has one of the lowest per capita income levels in the world (GovernmentofMalawi and WorldBank 2006). The majority of the population (over 85 percent) lives in the rural areas (GovernmentofMalawi and WorldBank 2006). More than half of the population (52 percent) were living below the poverty line in 2005 (GovernmentofMalawi and WorldBank 2006). Poverty tends to increase southwards in Malawi but there are significant pockets of high poverty levels even in the north and pockets of deep poverty in districts with low overall poverty levels (Slater and Tsoka 2007).

The economy of Malawi is agricultural based. The agricultural sector accounts for about one third (34 percent) of the gross domestic product and contributes about 90 percent of the exports (Minot 2010). Maize is the most important food crop, followed by cassava, sweet potatoes, and sorghum. Tobacco is the dominant export crop grown by both small scale farmers and large estates holders. Other important cash crops are sugarcane, tea, cotton and coffee produced mainly by estate holders (Slater and Tsoka 2007).

Households mainly derive their livelihoods from household farming or fishing with limited opportunities for off farm income (GovernmentofMalawi and WorldBank 2006). The situation is even worse in rural areas where about only 8 percent of the household heads derive their livelihoods solemnly from waged or salaried employment (GovernmentofMalawi and WorldBank 2006). Livestock rearing as a livelihood activity is not so common because of very low livestock ownership by regional standards

(Government of Malawi and World Bank 2006). The sale of own labor (casual labor) or “ganyu” as is commonly referred to in Malawi is another livelihood activity. About 90 percent of the rural households derive their livelihoods from the rural labor market and this has mainly been attributed to the occurrence of chronic food insecurity (Whiteside and Carr 1997; Whiteside 2000).

The data used in this study comes from 6 districts of Malawi namely; Thyolo, Chiradzulu, Zomba and Machinga, in the southern region and Lilongwe and Kasungu in the central region (See figure 5 in the appendix 2 for the map showing the study sites). Thyolo and Chiradzulu have the highest rural population density of 343 and 379 people per square kilometer respectively. This is comparatively higher than the average of 185 people per square kilometer in the southern region (National Statistical Office of Malawi. 2008). Lilongwe and Kasungu have even a lower population density when compared to these other four southern districts (National Statistical Office of Malawi. 2008). These two districts are however unique because Lilongwe has a close proximity to the city and hence easy access to the market whereas Kasungu is characterized by large land sizes and estates.

## **4.2 Data sampling, Collection and Variables used**

These districts (Thyolo, Chiradzulu, Zomba, Kasungu, Lilongwe and Machinga) form the Enumeration Areas (EAs) which were demarcated following the Intergrated Household Survey (HIS) of 2004 by the National Statistical Office of Malawi. 15 EAs form the primary sampling units which were randomly selected. From Thyolo, Chiradzulu and Machinga districts, two EAs were randomly selected and in Zomba, Kasungu and Lilongwe districts three EAs were randomly selected. From each EA, 30 households were randomly selected in 2006 and 2007. However, due to attrition and lack of enough information collected from some households, the sample observations reduced to 378 households in 2009 (Refer to Table 1 on the number of households interviewed in each district).

**Table 1: Number of Households sampled in the study**

District	No. of hhllds	Percentage number of households in each activity					
		Business	Formal work	Tobacco	Maize	othercrops	Forest activities
<b>Thyolo</b>	51	39.2	25.5	3.9	98.0	98.0	74.5
<b>Zomba</b>	84	38.6	9.6	36.1	90.4	100	80.7
<b>Chiradzulu</b>	35	52.9	11.9	26.5	100	100	94.1
<b>Machinga</b>	49	28.6	6.1	8.2	89.8	100	67.4
<b>Kasungu</b>	88	34.1	21.6	58.0	97.7	96.6	73.9
<b>Lilongwe</b>	71	31.4	24.3	30.0	95.7	85.9	75.7
<b>Total</b>	378						

The largest number of respondents was from Kasungu (88 households) followed closely by Zomba (84 households), Lilongwe (71 households), Thyolo (51 households), and Machinga (49 households) respectively. Chiradzulu (35 households) had the least number of respondents. Almost all the households in all the districts were involved in the production of other crops other than maize and tobacco.

The information on household labor allocation to the different activities was captured by the use of a simple experiment. The household head in collaboration with the partner (if both exist) were given ample time to try and place twenty matchsticks to well explained diagrammatic representations of the various activities that households might engage in, in a year (based on the amount of time they give to each of these activities). The activities were divided into household activities (fetching water, cooking, washing plates etc), firewood collection, forest activities (excluded firewood collection but included forest clearing, participation in forest based wage work and self employment), other agricultural activities (production and marketing of other crops other than maize and tobacco, livestock production and casual work on other people's farm), maize related activities (production and marketing), tobacco activities (production and marketing) and lastly,

other non agricultural activities (off farm and non forest activities). The enumerators then recorded the number of matchsticks given to each activity. The assumption here is that, the household is a single decision making unit such that decisions are made jointly to maximize the household's utility.

Data was also collected on key household characteristic variables like land size holdings, number of household members, major income sources(crops, livestock, forests products, gifts, enterprises), household socio economic characteristics, household life cycle variables like the age of both children and adults. Plot level questionnaires were also issued to households to capture the information on input use on the maize and tobacco plots and the output (See questionnaire attached in Appendix 3).

Apart from the household questionnaire, a focus group discussion in each village was also carried out. Information such as access to markets, roads, welfare perceptions was captured from these focus group discussions. The variables used in the analysis are provided in Table 2 in the next page.



**Table 2: Presents the variable names, their description and how they were measured**

Variable name	Variable label	Measurement
age	age of the household head	Number of years
highesteduc	Highest education attained by household head	Number of years
hhsiz	Household size	Total number of household members (counting) expressed in consumer units <sup>3</sup>
femalelabour	Number of female labour force	Total number of female members in the household that are active
malelabour	Number of male labour force	Number of male members in the households who are active
hhlabour	Number of household members that are active	Number of household members that are active
consworkratio	consumer worker ratio	Ratio of consumers to the household labor
realassetval	real asset value	The real value of asset in Malawi Kwacha(MK)
tlunits	total tropical livestock units	Number of animals expressed in livestock units <sup>4</sup>
landendow	Household total land holding	Measured in hectares
fornetvalue	forest net value	Value reported by the respondent (MK)
netother	net value of other crops	Total quantity reported by the respondent multiplied by the market price less total variable costs (MK)
netenterp	net income from enterprises	Total value less operational costs (MK)
totganyu	(sum) total income from casual work on other peoples farms	Total value received by all household members (MK)
totinformal	(sum) total income from formal employment	Total payment received by all household members involved in formal employment (MK)
realivval	Real value of livestock assets	Real value of livestock (MK)
nettobaco	net returns from tobacco	Total value of tobacco sales less total variable costs including hired labor <sup>5</sup> (MK)
netmaize	net returns from maize	Total value of maize sales less total variable costs including hired labor (MK)
totnetincome	Total net income	Total net income from (MK)
anyshock05	had any shock in 2005 or not	As reported by the household
anyshock06	1=Yes 0=No	As reported by the household
anyshock07	had any shock in 2007 or not	As reported by household
anyshock08	had any shock in 2008 or not	As reported by the household
anyshock09	had any shock in 2009 or not	As reported by the household
sexhhhead1	sex of the household head	Sex of the household head
dilong	resident in Lilongwe or not	As reported by the respondent
dikasung	resident in kasungu or not	As reported by the respondent
dimaching	resident in Machinga or not	As reported by the respondent
dichirad	resident in Chiradzulu or not	As reported by the respondent
dizomba	resident in Zomba or not	As reported by the respondent
dithyolo	resident in Thyolo or not	As reported by the respondent
satisfiedlife	Satisfied with life in the past year	As reported by the household
suffproincome	Sufficient household food production	As reported by the household
welloffvillage	well off of the village	As reported by the household

<sup>3</sup> For adult male members, the consumer unit is 1, for female adult members it is an equivalent of 0.8 whereas for children between 12 and 5, it is 0.5 and for children less than 5, it is 0.3.

<sup>4</sup>

<b>Variable name</b>	<b>Variable Label</b>	<b>Measurement</b>
Lenterprise	Labor share to enterprise	Number of matchsticks allocated to non agricultural activities weighted by the proportion of net income from enterprises to the total income from non agricultural activities
Lformal	Labor share to formal employment	Number of matchsticks allocated to non agricultural activities weighted by the proportion of net income from formal work to the total income from non agricultural activities
Lothercrop	Labor share to other crop	Number of matchsticks allocated to other agricultural activities weighted by the proportion of net income from other crops to the total income from other agricultural activities (excluding income from maize and tobacco)
Lganyu	Labor share to Casual labor on other peoples farm	Number of matchsticks allocated to other agricultural activities weighted by the proportion of net income from casual work to the total income from other agricultural activities (excluding income from maize and tobacco)
Llivestock	Labor share to livestock	Number of matchsticks allocated to other agricultural activities weighted by the proportion of net income from livestock to the total income from other agricultural activities (excluding income from maize and tobacco)
ltobacco	Labor share to tobacco	Number of matchsticks out of 20 allocated to tobacco activities
lmaize	Labor share to maize	Number of matchsticks out of 20 allocated to maize activities
Lforest	Labor share to forests	N0. of match sticks out of 20 allocated to forest activities
Shenterprise1	Netincome share from Enterprise	Proportion of netincome from enterprises to total net income
Sformal1	Net income share from formal employment	Proportion of net income from formal employment to total net income
Sothercrops1	Net income share from other crops	Proportion of the netincome from othercrops (not maize and tobacco) to total net income
Sganyu1	Net income share from Casual Labor on other people's farms	Proportion of net income from casual work to total net income
Slivestock1	Net income share from Livestock	Proportion of net income from livestock to total net income
Stobacco1	Net income share from Tobacco	Proportion of net income from tobacco to total net income
Smaize1	Net income share from maize	Proportion of net income from maize to total net income
Sforest1	Net income share from forest	Proportion of net income from forest to total net income

## 5.0 Results and Discussion

To answer the research questions, I proceeded by first identifying the livelihood strategies. Here, I employed factor analysis of the major activities that take place in the area. These are tobacco, maize and other crops (rice, groundnuts, pigeon peas and many others) production, livestock rearing, forest activities, casual work on other people's farms, business and formal employment. Based on factor analysis, I grouped these activities into factors such that activities within a given factor are very similar but different between factors. Prediction of these factors generated factor scores. Applying cluster analysis on these factor scores, I categorized households into distinct clusters of livelihood strategies. For those clusters in which observed households were very few, I combined them to those strategies that were similar to them (where the factor scores were positive for the activities or slightly negative).

After identifying the distinct livelihood strategies, I embarked on mapping out the superior and inferior livelihood strategies using the approach of stochastic dominance used by (Brown, Stephens et al. 2006). In this method, cumulative frequency curves of the total incomes of each subgroup (livelihood strategy) are used. I also employ poverty indicators based on Foster Greer Thorbecke (FGT) indices and Three I's of poverty (TIP) curves to establish the prevalence of poverty in each of the livelihood strategies identified.

Lastly, I used the multinomial logit model to find out limiting factors to the choice of higher return strategies by rural households in Malawi. I use two separate regressions, one in which household size is considered and the other in which household labor is considered. In these regressions, I ensured that I control for all factors that may determine household's choice to the given strategies based on the sustainable livelihood framework presented in section 2. Additionally, I use strictly exogenous variables. I categorize these factors into human capital, physical capital and geographical location. The results and discussions are presented in the subsequent sections.

## 5.1 Descriptive statistics

Here, I briefly discuss basic statistics that are relevant to livelihood strategies identification and determining factors to choosing these strategies.

### 5.1.1. Asset distribution across income groups

I categorize households into three<sup>6</sup> income groups based on their total incomes. The lower income group has their incomes in the bottom 40 percent of total income in the sample. 181 households belong to this group. The second middle income groups are those households that have income between 40-80 percent of total income in the sample. 88 households belong to this group. The third group is the upper income group where households have income above 80 percent of the total income in the sample. 109 households belong to this group. Table 3 shows the asset distribution across income groups of households. Households in the low income group own the least household assets followed by those in the middle income group (40-80%). Those in the upper income group (top 20 percent) own more household assets as would be expected. For example on average, they own 1.44 hectares of land and have an education above standard five. Those in the upper income group also have their household heads younger than those in the middle and lower income group.

Also from Table 3, the highest percentage of households in the low income group are from Zomba and Thyolo districts, those in the middle income groups are also from Zomba and then Kasungu and those in the highest income group are mainly from Kasungu district.

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<sup>6</sup> I use three income groups rather than the usual quartile grouping because a substantial number of households can be found in each of the three groups unlike when the households are categorized into four.

**Table 3: Summary of Asset distribution across income categories**

Assets	Income categories			
	Lower income	Middle income	Upper income	All households
<b>Natural capital</b>				
Land Area (Hectares)	0.83(0.55)	1.14(1.08)	1.444(1.28)	1.08(0.98)
<b>Human capital</b>				
Household Labor	3(1.27)	3(1.29)	4(1.44)	3(1.36)
Household size	5(1.99)	6(1.88)	6 (2.15)	5(2.04)
Education levels	4 (3.47)	5 (3.41)	6(3.56)	5(3.58)
Age	48(17.14)	46(15.46)	44(13.87)	46(15.9)
<b>Physical capital</b>				
Other Household assets (equipment)	4124.74 (8225)	8300.624 (18194)	20802.45 (44240)	9848 (26704)
Livestock units	0.67(0.81)	1.00(1.19)	2.5(3.17)	1.27(2.01)
<b>Geographical location</b>				
Thyolo	20.4%	5.7%	8.3%	13.5%
Zomba	26.0%	27.3%	11.9%	22.2%
Chiradzulu	11.1%	8.0%	7.3%	9.2%
Machinga	14.3%	8.0%	14.7%	13.0%
Kasungu	11.6%	27.3%	39.5%	23.3%
Lilongwe	16.6%	23.9%	18.4%	18.8%

Figures in parenthesis are standard errors

### 5.1.2. Income and labor shares from the livelihood activities

Table 4 below shows the percentage income shares from the different activities within each income group. We note that maize and other crops (groundnuts, rice, cassava, pigeon peas, beans and others) contributes a significant proportion of income in all the income groups. For the middle and upper income groups, income from tobacco and business/enterprises also contributes a relatively large share of the total net income. Tobacco production in Malawi is often associated with well to do households. For households in the upper income group unlike those in the middle and lower income group, casual work on others farms (“ganyu”) does not contribute to a significant

proportion of their total net income. Following the focus group discussions, casual work on other people’s farms was associated with low status and poverty.

**Table 4: Summary of percentage income shares from the different activities**

Activites	Income group			
	Lower (income	Middle income	Upper income	All Hhlds
Maize	47.8	39.4	40.0	42.5
Tobacco	8.5	16.9	15.6	12.6
Othercrops	21.2	19.1	20.0	20.7
Livestock	1.7	2.0	3.3	2.3
Business/Enterprise	4.0	5.6	6.7	5.8
Formal employment	0.1	2.3	3.3	2.3
Casual Work “ganyu”	6.2	5.6	2.2	4.6
Forest	10.5	9.0	8.9	9.2

Hhlds refers to households

Table 5 below, provides a summary of the percentage labor share to the different activities by income groups. We note that labor share to maize and forests form a significant proportion of labor for all households in all the quartiles. This is because maize is the staple food in Malawi and rural households in this country are highly attached to this crop. Households in the upper income group unlike their counterparts in the middle and lower income group allocate less of their labor to casual work on others farms. This is for the same reason as mentioned above that casual work on other people’s farms following the focus group discussions is associated with low household status.

**Table 5: Summary of labor shares to the different activities by income quartile**

Activities	Income group			
	Lower income (%)	Middle income (%)	Upper income (%)	All (%)
Maize	37.9	34.2	34.1	35.5
Tobacco	6.9	14.2	12.7	10.5
Other crops	17.4	15.8	16.8	16.8
Livestock	1.33	1.7	2.5	17.1
Business/Enterprises	3.18	4.7	5.9	4.3
Formal skilled work	1.4	2.7	3.2	3.0
Casual work (ganyu)	5.3	4.4	1.9	4.9
Forest	26.8	22.3	23.0	24.3

#### 5.1.4 Correlations of the Labor and Income shares

Table 6 below shows the correlations of the share of labor to the various activities. There is a low correlation amongst the labor shares to the various activities hence a low level of multicollinearity between these activities. Formal employment and enterprises are for example only negatively correlated to a magnitude of 0.1297. The share of labor allocated to maize and tobacco, forest and maize are negatively correlated to a magnitude of 0.3054 and 0.2779 respectively.

**Table 6: Correlation of the labor shares to the different activities**

	Lenter	Lform	Lother	Lganyu	Llives~c	ltobacco	lmaize	Lforest
Lenterprise	1.000							
Lformal	-0.130	1.000						
Lothercrop	0.018	-0.102	1.000					
Lganyu	-0.060	-0.023	-0.053	1.000				
Llivestoc	-0.004	-0.017	-0.120	-0.092	1.000			
ltobacco	-0.095	-0.108	-0.209	-0.138	-0.112	1.000		
lmaize	-0.090	0.018	-0.049	0.016	0.012	-0.305	1.000	
Lforest	-0.090	-0.059	-0.186	-0.043	-0.012	-0.122	-0.278	1.000

Table 7 below presents the correlations of the net income to the various activities. High correlations exist between off farm work (ganyu) and other crops, tobacco, maize and forests activities. Maize and tobacco activities also exhibited some high degree of negative correlation (-0.70), so does the forest and tobacco (0.54)<sup>7</sup> and forest and maize (-0.55). Following these correlations, othercrops and tobacco can be grouped together, maize and forest also belong to the same group, and off farm casual work can be grouped together with maize. These groupings will be visible in factor analysis that follows in the next section.

**Table 7: Correlation of the net income shares to the different activities**

	shent	sform	sother	sgany	slives	stobac	smaize1	sforest1
shenterpri~1	1.000							
sformal1	-0.05	1.000						
sothercrops1	-0.12	-0.06	1.000					
sganyu1	-0.08	-0.07	-0.54	1.000				
slivestock1	-0.07	-0.07	-0.14	-0.06	1.000			
stobaco1	-0.02	-0.04	-0.74	0.74	0.00	1.000		
smaize1	-0.03	-0.02	0.18	-0.80	0.01	-0.70	1.000	
sforest1	-0.03	-0.01	-0.40	0.62	-0.03	0.54	-0.55	1.000

### 5.1.3 Welfare perceptions

Table 8 below, provides a summary of the percentage welfare perceptions across the income quartiles. Those in the upper income quartile were not satisfied with their life in the past year and feel less well off than they were five years ago. From this table, we also note that a significant proportion of the households reported a shock in 2008 and 2009.

<sup>7</sup> Forest and tobacco activities exhibit positive correlations in the income shares possibly due to the fact that these two activities are complementary activities in Malawi. Timber and other forest products are used as stands when drying tobacco.



**Table 8: Summary of welfare perceptions across income groups**

	Lower Quartile (%)	Middle Quartile (%)	Upper Quartile (%)
<b>Satisfaction with life in past year</b>			
Very satisfied	14.4	18.6	19.4
Unsatisfied	43.9	38.4	36.1
Neither satisfied nor not	8.3	5.8	12.0
Satisfied	33.3	37.2	32.4
<b>Welfare compared to 5 years ago</b>			
Less well off	32.4	26.7	36.5
Same	38.0	41.9	32.7
Better	29.6	31.4	30.8
<b>Reported Shock</b>			
2005	21.6	23.9	26.9
2006	22.8	21.6	24.1
2007	32.2	33.0	33.0
2008	63.54	67.1	63.9
2009	66.11	65.9	61.9

## 5.2. Identification of Livelihood Strategies

In this section, livelihood strategies are identified using two different approaches. The first approach uses factor and cluster analysis of the labor shares allocated to the different activities while the second approach uses factor and cluster analysis of the income shares from the different activities.

### 5.2.1. Use of Labor shares

Factor loadings and predicted factor scores following factor analysis of the labor shares to these different activities are shown in Table 9 and 10 below.

The activities can thus be grouped as follows: factor1 consist of maize/non tobacco production activities. Factor2 consists of formal/non enterprises/none other crops activities, factor3 consists of the forest activities and factor4 consists of the livestock/none off farm casual work activities. It is also important to note that the

production of other crops does not appear as one of the activities that forms a livelihood strategy amongst these rural households in Malawi. This could probably be due to the fact that almost all households allocate labor to this activity such that there is not so much variation between households.

**Table 9: Factorial Analysis based on labor shares**

Variable	Factor1	Factor2	Factor3	Factor4	Uniqueness
Enterprise	0.035	<b>-0.527</b>	0.381	0.246	0.516
Formal	0.150	<b>0.525</b>	-0.272	-0.014	0.629
Othercrop	0.368	<b>-0.610</b>	0.080	-0.232	0.432
Ganyu	0.218	0.158	-0.01	<b>-0.631</b>	0.529
Livestock	0.053	0.295	0.378	<b>0.655</b>	0.338
Tobacco	-0.676	-0.179	<b>-0.603</b>	0.172	0.117
Maize	<b>0.738</b>	0.218	-0.180	0.197	0.338
Forest	-0.482	0.348	<b>0.612</b>	-0.316	0.172

Principle component factor method used. Factors rotated using varimax method. The retained factors account for 61.62 percent of the variance and represent factors with Eigen values greater than 1.11003 (initially five factors had been retained with Eigen values greater than 1.002, but the fifth factor had no meaning)

**Table 10: Predicted factors scores from factorial analysis of the labor shares**

Variable	Factor1	Factor2	Factor3	Factor4
<b>Enterprise</b>	0.061	0.004	<b>-0.548</b>	0.196
<b>Formal</b>	0.047	-0.101	<b>0.484</b>	0.014
<b>Othercrops</b>	0.163	-0.172	<b>0.448</b>	-0.315
<b>Ganyu</b>	0.260	0.136	0.181	<b>-0.494</b>
<b>Livestock</b>	0.147	0.033	0.011	<b>0.703</b>
<b>Tobacco</b>	<b>-0.723</b>	-0.125	0.074	-0.038
<b>Maize</b>	<b>0.305</b>	-0.245	0.211	0.115
<b>Forest</b>	0.173	<b>0.726</b>	0.052	0.022

Subsequently, five distinct livelihood strategies are identified as shown in Table 11 below following cluster analyses of the factor scores. The first livelihood portfolio consists of maize, formal work, forests, livestock excluding casual work “ganyu”, othercrops and

enterprises, 54 households are involved here. The second cluster consists of maize /none tobacco livelihood strategy and 97 households are involved in this strategy. The third cluster consists of forest, formal work excluding enterprises/ businesses and other crops and 84 households are involved, the fourth consists of forest activities of which 88 households are involved and the last consists of maize, livestock/ none ganyu and tobacco and only 45 households are involved. The first cluster (strategy) is referred to as the *on farm food, livestock and skilled non- farm strategy*. The second strategy is referred to as the *on farm food/non cash crop strategy*. The third strategy is referred to as the *non - farm forest and skilled employment strategy*. The fourth strategy is referred to as the *non -farm forest activities* and the last strategy is referred to as the *on farm food, livestock/non cash crop strategy*.

**Table 11: Clustering of the factor scores based on factorial analysis of the labor shares**

	<b>Cluster 1 N=54</b>	<b>Cluster 2 N=97</b>	<b>Cluster 3 N=84</b>	<b>Cluster 4 N=88</b>	<b>Cluster 5 N=45</b>
<b>Maize/Non tobacco</b>	0.643 (0.337)	0.629 (0.504)	0.181 (0.731)	-1.451 (0.539)	0.336 (0.501)
<b>Formal/Non enterprise/ Non othercrop</b>	-0.427 (0.660)	-0.595 (0.704)	1.288 (0.634)	-0.280 (0.759)	-0.064 (0.712)
<b>Forest</b>	1.027 (0.925)	-0.134 (0.663)	0.204 (0.710)	0.129 (0.653)	-1.576 (0.757)
<b>Livestock/ Non ganyu</b>	1.158 (1.296)	-0.550 (0.909)	-0.230 (0.718)	-0.094 (0.405)	1.158 (1.296)
<b>Strategies</b>	Maize, Formal work, Forest, Livestock / Non enterprise, Non othercrops, non ganyu	Maize/ Non tobacco	Forest, Formal work/Non enterprise, non othercrop,	Forest activities	Maize, Livestock/non ganyu, non tobacco
<b>Name of Strategy</b>	<b>On farm food, livestock and skilled non farm strategy</b>	<b>On farm food/non cash crop strategy</b>	<b>Non farm forest and skilled employment strategy</b>	<b>Non farm forest activities</b>	<b>On farm food, livestock/non cash crop strategy</b>

## 5.2.2 Use of Income shares

Factor loadings and predicted factor scores following factorial analysis are presented in Table 12 and 13. The two results were slightly different with regards to the maize activity. Maize production ceases to be an activity when factor loadings are considered but becomes an activity contributing to livelihood strategies when predicted factor scores are considered. However, other results are the same in both cases. I adapt results from the predicted factor scores which tend to overcome problems due to data inconsistencies.

**Table 12: Factor loadings to the different activities (Net income shares)**

Variable	Factor 1	Factor2	Factor3	Factor 4	Uniqueness
Enterprises	-0.003	0.135	<b>0.936</b>	0.087	0.098
Formal work	-0.025	-0.463	-0.139	<b>0.846</b>	0.050
Othercrops	<b>-0.684</b>	-0.351	-0.183	-0.421	0.198
Ganyu	<b>0.915</b>	-0.091	-0.070	-0.130	0.134
Livestock	0.004	<b>0.822</b>	-0.344	0.201	0.166
Tobacco	<b>0.915</b>	0.085	0.032	0.074	0.152
Maize	<b>-0.806</b>	0.206	0.065	0.202	0.263
Forest	<b>0.752</b>	-0.109	-0.050	-0.072	0.415

Principle component factor method used. Factors rotated using Varimax method. The retained factors account for 81.55percent of the variance and represent factors with Eigen values greater than 1.00885

**Table 13: Predicted factor scores following factorial analysis of the income shares**

Variable	Factor1	Factor2	Factor3	Factor4
Enterprises	0.007	0.012	<b>0.967</b>	-0.005
Formal work	0.016	0.044	0.017	<b>0.991</b>
Othercrops	0.000	0.000	0.000	0.000
Ganyu	<b>0.401</b>	0.213	0.141	0.099
Livestock	-0.018	<b>0.906</b>	-0.061	-0.040
Tobacco	0.414	<b>0.495</b>	0.374	0.260
Maize	-0.085	<b>0.660</b>	0.479	0.358
Forest	<b>0.244</b>	-0.062	-0.050	-0.003

The activities were thus grouped as follows: factor1 consisted of off farm worker and forest activities. Factor2 consisted of tobacco, livestock and maize activities, factor3 consisted of enterprise/business activities and factor4 consisted of formal of the livestock/none ganyu activities. It is also important to note that the production of other crops like in the case of labor share factor scores does not appear as a livelihood activities amongst these rural households in Malawi. This could also probably be due to the fact that almost all households attain income from this activity such that there is not so much variation between households.

Subsequently, five clusters are identified as shown in Table 14 following cluster analyses. The first cluster consists of enterprises which is least associated with maize, tobacco and livestock, 24 households were involved here. The second cluster consists of formal employment which is also less associated with enterprises and 30 households were involved, the third cluster consists of forest, and off farm casual work with 234 households involved and is least associated with enterprises. The last cluster consists of the forest, off farm casual work, maize, tobacco and a livestock activity, 22 households were involved and is least associated with enterprises. Due to the few observations in the second and fifth clusters, I combine them to form the non farm business strategy. I adapt a similar naming pattern as in Barrett et al. (2001): where the first strategy that consists of forest and casual work (“ganyu”) is termed as the forest, off farm worker strategy. The second in which households are engaged in enterprises is termed as the non-farm business strategy and the last strategy in which households are involved in all activities both skilled and unskilled is termed the mixed strategy.

**Table 14: Clustering of the factor scores based on factorial analysis of net income shares**

	<b>Cluster1</b> <b>N=24</b>	<b>Cluster 2</b> <b>N=30</b>	<b>Cluster 3</b> <b>N=54</b>	<b>Cluster 4</b> <b>N=234</b>	<b>Cluster 5</b> <b>N=22</b>
<b>Forest and Ganyu</b>	-0.104 (0.168)	-0.057 (0.264)	-0.095 (0.375)	0.038 (1.200)	0.0160 (0.881)
<b>Maize, Tobacco and Livestock</b>	-0.325 (0.403)	-0.243 (0.243)	-0.007 (0.609)	-0.240 (0.415)	3.255 (1.494)
<b>Enterprises</b>	2.747 (0.699)	-0.310 (0.326)	0.965 (0.475)	-0.434 (0.3540)	-0.322 (1.130)
<b>Formal employment</b>	-0.261 (0.412)	2.910 (1.149)	-0.174 (0.453)	-0.294 (0.262)	-0.125 (0.876)
<b>Strategies</b>	<b>Enterprises</b>	<b>Formal employment</b>	<b>Enterprises</b>	<b>Forest and Ganyu</b>	<b>Forest and Ganyu, Maize, Tobacco and Livestock</b>

Figures in parenthesis are standard errors

Cluster 1 and 3 are combined and named the non farm business strategy. Cluster 2 and 5 are combined and named the mixed strategy and cluster 4 is named the forest and off farm worker strategy.

### 5.2.3 Comparing the two approaches

The above results show that the two approaches (using labor shares and net income shares) give rise to slightly different livelihood strategies. In using the labor shares, enterprises, tobacco production, casual labor “ganyu” are not part of the livelihood activities in any of the livelihood strategies. However, in using the net income shares, all these livelihood activities (apart from other crops) form a part of at least one of the livelihood strategies identified.

The difference may be due to the fact that information on labor shares to the different activities may have been a result of a long term sequence (many years) of how the rural households allocated their labor to the various activities and not necessarily in the year 2009. Thus whereas the net income shares reflect the income in these households in 2009, this may not have been the same case for labor shares. It thus calls for further empirical investigation that involves the use of panel data for both the labor shares and income shares.

The similarity that exists in both approaches is that the production of other crops like beans, rice, groundnuts and many others do not appear as a livelihood activity in any of the identified livelihood strategies yet it contributes a substantial part of the total net income for households. This could possibly be explained by the fact that factorial analysis as a data reduction approach group variables that are multicollinear together and then embarks on identification of variables that exhibit strong variation amongst one another (these are the factors). So a variable such as other crops may not have exhibited strong variation between categories as almost every household sampled was involved in it as a livelihood activity. Otherwise both approaches have the production of maize, participation in forest activities, formal employment, forest activities and livestock rearing as activities that form livelihood strategies.

For the purposes of this research which focuses on the cross sectional data of 2009, subsequent results are based on those livelihood strategies identified using the net income approach. Additionally, I take up the income approach because it includes tobacco and off farm casual labor as one of the livelihood activities and these have been documented in literature to be key activities in Malawi (Whiteside 2000; Dorward, Chirwa et al. 2008).

### **5.3 Livelihood outcomes**

Following the livelihood strategies identified from the income approach (that is; forest and off farm worker strategy, non farm business strategy and the mixed strategy), I investigate the livelihood outcomes in these strategies. Specifically, I look at the superiority of the livelihood strategies in terms of the stochastic income dominance and the prevalence of poverty in each of these strategies.

Table 15 below presents the summary of the total net income across the different income groups in the different livelihood strategies. Households in all the income groups participated in the forest and off farm worker strategy the most, followed by the non-farm business strategy and lastly the mixed strategy. However, households in the lower income

group dominated in the forest and off farm worker strategy while households in the upper income group, dominated in both the non farm business strategy and the mixed strategy. Lastly, the mean income was highest in the non-farm business strategy followed by the mixed strategy and income from the forest and off farm worker strategy was the lowest.

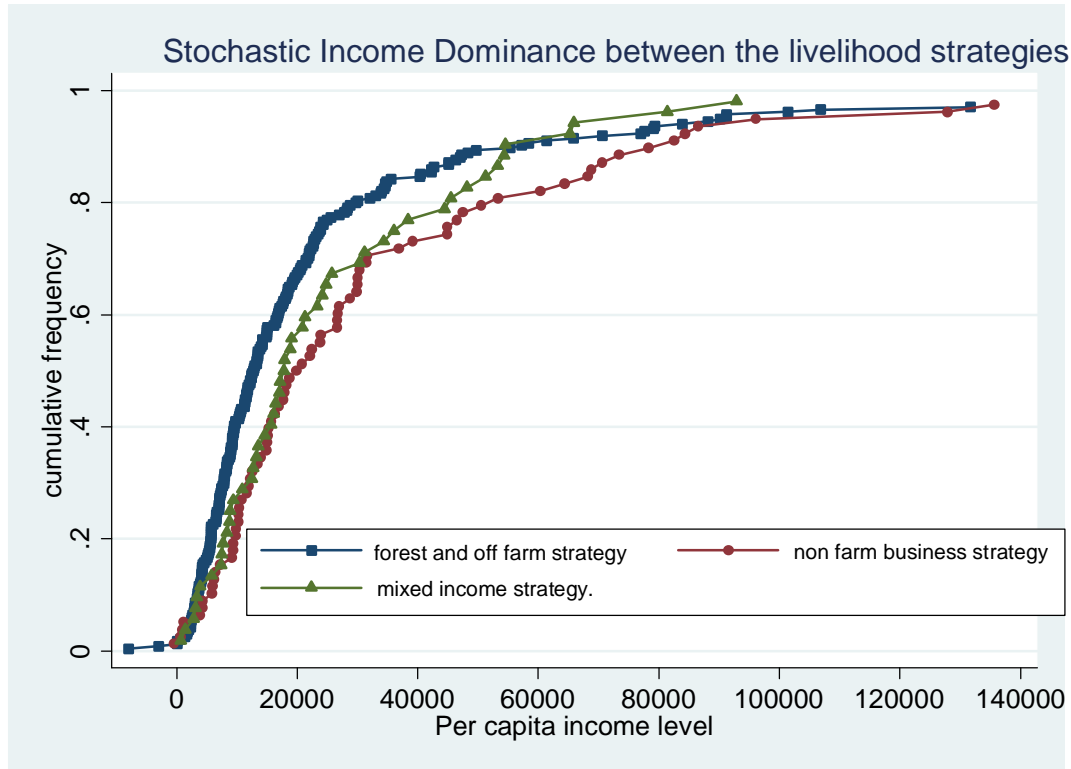
**Table 15: Summary statistics of households income groups participation in each strategy**

Strategies	Percentage number of households involved in the strategies			Mean for all
	Lower income category	Middle Income category	High income category	
Forest off farm worker strategy	70.1	69.3	47.4	25612 (49323)
Non farm business strategy	17.1	20.5	30.5	37344 (52152)
Mixed strategy	12.2	10.2	22.1	27996 (29767)

### 5.3.1 Income Dominance of the strategies

Following (Whitmore and Findlay 1978) and (Brown, Stephens et al. 2006), a livelihood strategy is first order stochastically dominant over another strategy if and only if for every possible income level, the strategy has a lower cumulative density, reflecting a greater likelihood of drawing higher incomes.





**Figure 3: Stochastic Income dominance between the livelihood strategies**

Following figure 3 above, the forest and off farm worker strategy is an inferior livelihood strategy since its cumulative density is higher than the other two livelihood strategies (non-farm and mixed livelihood strategies). At lower per capita levels of less than 20,000MK, the non-farm and mixed income strategies are almost the same in terms of rankings. However at higher income levels (more than 20,000MK), the non-farm strategy stochastically dominates the mixed strategy since it has a lower cumulative density.

If I follow the assumption that rural households are risk adverse and would prefer higher incomes, then the non-farm business strategy and the mixed strategy are superior over the forest, off farm worker strategy. These findings are similar to those of Barrett et al (2001) in his comparative studies across different African agro-ecologies. He finds that non-farm income stochastically dominates those entirely based on agriculture and specifically those involving off farm worker, “ganyu” activities. In the above case however, the mixed strategy is income dominant over the forest and off farm worker

strategy mainly because besides on farm work, the households are also engaged in skilled employment which also offers high returns. Forests and off farm worker strategy are stochastically the least dominant in this study and this concurs with literature such as Angelsen and Wunder (2003) who note that forest activities and particularly non timber forest products usually offer lower returns in developing countries.

To find out if the differences in per capita incomes are statistically significantly different, I use a t tests to compare their mean per capita incomes as shown in Table 16

**Table 16: t tests of the per capita incomes from the three livelihood strategies**

<b>Livelihood strategies</b>	<b>No hhd</b>	<b>Mean and standard deviation</b>	<b>Difference in mean</b>	<b>T value</b>	<b>P value</b>
<b>Forest and off farm worker strategy with mixed strategy</b>	234	25612 (49323)	-2384	-0.3349	0.7379
	52	27995 (29767)			
<b>Forest and off farm worker strategy and the non- business strategy</b>	234	25612 (49323)	-11731*	-1.7931	0.0739
	78	37344 (52152)			
<b>Non farm business and mixed Strategy</b>	78	37344 (52152)	0.2439	1.1707	0.2439
	52	27995 (29767)			

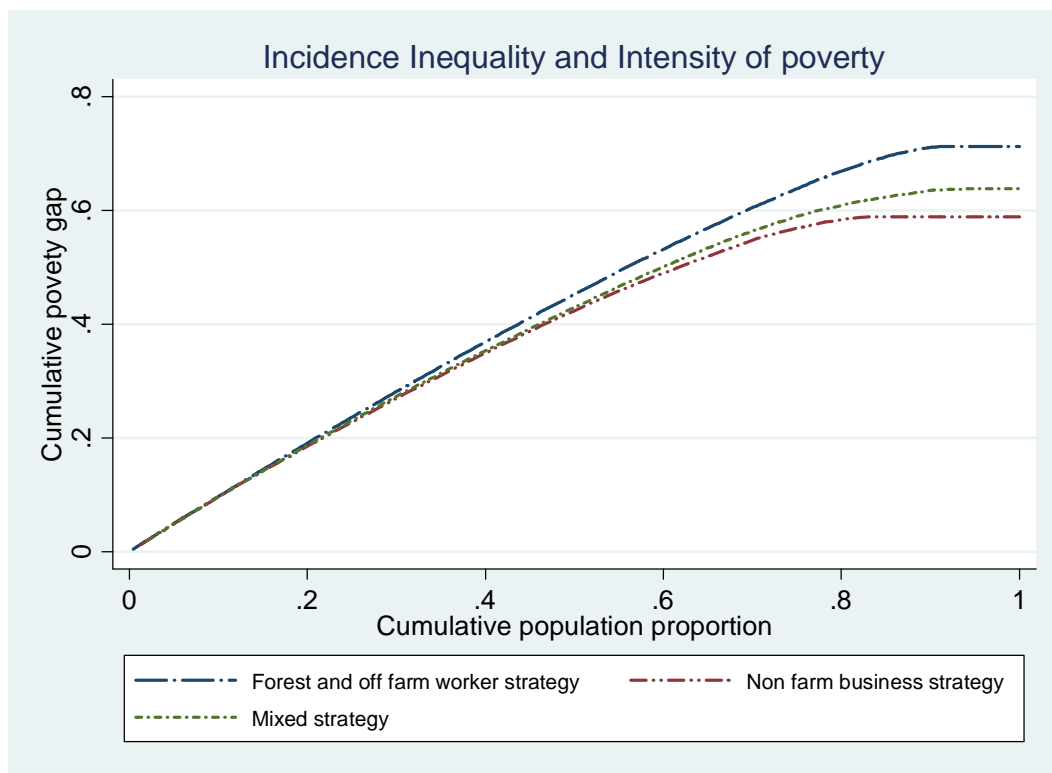
\*\*\* represents significance at 1 percent level, \*\* represents significance at 5percent level, \*represents significance at 10 percent level. Figures in parenthesis are standard errors

From Table 16 above, the per capita income from forest and off farm worker strategy is statistically significantly different from that of the non farm business strategy. It is not statistically different from the mixed strategy confirming the hypothesis that there exists statistical significant difference in the per capita income of some strategies. However the per capita incomes from the non- farm business strategy and the mixed strategy are not statistically different and the hypothesis mentioned above is rejected. Both the mixed strategy and the non- farm strategy therefore offer quite similar returns and one may not

necessarily be superior to the other. The next section looks at the prevalence of poverty within each of these strategies.

### 5.3.2 Poverty prevalence<sup>8</sup>?

To answer this question, I used the curves of the Three I's of poverty (TIP) which graphically and simultaneously illustrates the incidence, intensity and inequality dimensions of aggregate poverty. It is obtained by plotting the cumulative normalized poverty gap on the vertical axis and the cumulative population proportion on the horizontal axis.



**Figure 4: Curves showing the Incidence, Inequality and Intensity of poverty in the strategies**

Figure 4 above shows the Three I's of poverty (TIP) curves for the different livelihood strategies in the study area. The TIP for the forest and off farm strategy dominates the rest of the other curves. Following Jenkins and Lambert (1997), if the TIP curve lies

<sup>8</sup> The World Bank (2008) poverty line is \$ 1.25 per capita per day which translates to 456.25 \$ in a year. I use a conversion of 1\$ is an equivalent of 192.446

wholly above another TIP curve, then there is a situation of TIP dominance and such a curve portrays a higher incidence, intensity and inequality of poverty. This shows that the incidence, inequality and intensity of poverty are highest in forest and off farm worker strategy than in the other strategies. The head count (91.5 percent), the average normalized poverty gap (71.2) and severity and acuteness of poverty of (58.7) reported in Table 17, further shows that households taking up this strategy are badly off in poverty terms. The non-farm business strategy has its TIP curve dominated by all the other livelihood strategies as the head count ratio, average normalized poverty gap and the severity and acuteness of poverty show in Table 17 below.

**Table 17: The headcount, poverty gap and the Severity of poverty in the different livelihood strategies**

Livelihood strategy	Head count ratio	Average Normalized poverty gap	Severity and Acuteness of poverty
Forest and off farm worker strategy	91.5%	71.2%	58.7%
Non-farm business strategy	85.9%	58.9%	45.4%
Mixed strategy	94.2%	63.8%	49.0%

These results therefore confirm that the non-farm business strategy is the most superior followed by the mixed strategy and lastly the forest and off farm worker strategy. Therefore, programmes for poverty reduction should target rural in this livelihood strategy before considering those that are in any other strategy.

## 5.5 Determinants of the Livelihood strategies

I used the multinomial logit model to determine factors that limit households from choosing higher return strategies. A summary of the mean and the standard errors of the variables used in the regression are presented in Table 20 in Appendix 1. I also use robust standard errors to control for heteroscedasticity in the regressions shown in Table 18 and 19. Due to a high level of multicollinearity between household size and household labor, I run two separate regressions; one with household size and the other with number of male and female laborers in the household in order to establish separate marginal effects

of these human capital variables on livelihood choices of households. The coefficients for other variables are not statistically different in the two regressions, as expected. The coefficients of each of the variables measures the effect of the variable on the relative likelihood of the household to choose that particular strategy compared with choosing the base category which in this case is the forest, off farm worker strategy.

**Table 18: Multinomial Logit of Livelihood strategies: household size considered**

<i>Dependent variable : Livelihood strategies</i>				
Variable	Non farm business strategy		Mixed strategy	
	Coefficient	Standard error	Coefficient	Standard error
<b>Human Capital</b>				
cateduc	0.227	(0.303)	0.914**	(0.352)
hhsiz	-0.166*	(0.073)	-0.045	(0.097)
hheadsex	-0.801*	(0.353)	0.080	(0.439)
age	-0.006	(0.009)	-0.006	(0.012)
<b>Physical Asset</b>				
tlunits	0.161	(0.087)	0.211**	(0.070)
landenown	-0.185	(0.231)	0.217	(0.191)
realassetval	-0.000	(0.000)	-4.24e-06	(5.66e-06)
<b>Shocks</b>				
anyshock05	0.417	(0.346)	-0.372	(0.436)
anyshock06	0.021	(0.340)	-0.285	(0.424)
anyshock07	0.437	(0.297)	0.222	(0.350)
anyshock08	-0.131	(0.300)	0.227	(0.368)
<b>Geographical Location</b>				
dithyolo	0.681	(0.496)	1.129*	(0.525)
dizomba	0.796*	(0.441)	0.134	(0.517)
dichirad	0.377	(0.533)	-0.054	(0.634)
dimaching	0.252	(0.517)	-0.763	(0.632)
dikasung	-0.961	(0.618)	-0.793	(0.555)
<b>Constant</b>	-0.202	(0.691)	-2.014	(0.961)

Base strategy is forest and off farm worker strategy

Multinomial logistic regression

Number of obs = 361

Wald chi2(32) = 54.6

Prob > chi2 = 0.008

Log pseudolikelihood = -288

Pseudo R2 = 0.102

\*\*\* represents 1 percent level of significance, \*\*5percent level of significance, \*10 percent level of significance. Figures in parenthesis are standard errors. Variables are as described in Table 2

**Table 19: Multinomial Logit model of livelihood strategies; household labor considered**

<b>Dependent variable ; Livelihood strategies</b>				
<b>Variable</b>	<b>Non farm business strategy</b>		<b>Mixed livelihood strategy</b>	
	<b>Coefficient</b>	<b>Std err</b>	<b>Coefficient</b>	<b>Stardard error</b>
<b>Human capital</b>				
cateduc	0.294	(0.307)	0.926**	(0.351)
femalelabour	-0.053	(0.207)	-0.069	(0.227)
malelabour	-0.274*	(0.147)	-0.055	(0.170)
age	0.000	(0.010)	-0.004	(0.012)
hheadsex	-0.815	(0.360)	0.089	(0.193)
<b>Physical Capital</b>				
tlunits	0.164	(0.092)	0.210**	(0.069)
landenown	-0.180	(0.228)	0.217	(0.193)
realassetval	-0.000	(0.000)	-3.94e-06	(5.77e-06)
<b>Shocks</b>				
anyshock05	0.397	(0.348)	-0.387	(0.442)
anyshock06	0.056	(0.343)	-0.280	(0.430)
anyshock07	0.456	(0.299)	0.224	(0.347)
anyshock08	-0.192	(0.302)	0.217	(0.369)
<b>Geographical Location</b>				
dithyolo	0.662	(0.494)	1.125*	(0.523)
dizomba	0.772*	(0.435)	0.121	(0.518)
dichirad	0.345	(0.533)	-0.072	(0.629)
dimaching	0.177	(0.519)	-0.772	(0.635)
dikasung	-1.082	(0.630)	-0.813	(0.551)
Constant			-2.129*	(0.821)
Base strategy is forest and off farm worker strateg				
Number of obs = 361				
Wald chi2(32) = 54.3				
Prob > chi2 = 0.015				
Log pseudolikelihood = -288				
Pseudo R2 = 0.01				

\*\*\* represents 1 percent level of significance, \*\*5percent level of significance, \*10 percent level of significance. Figures in parenthesis are standard errors. Variables are as described in Table 2

Statistically significant variables in the non farm business strategy are household size, sex of household head and location in the district of Zomba. When household labor is considered rather than household size, the number of male laborers is also statistically significant.

More specifically, female headed households are less likely to choose the non farm business strategy than the forest, off farm worker strategy. Large sized households are less likely to choose the non-farm business strategy compared to forest, off farm strategy. Specifically, households with more male laborers are less likely to choose non farm business strategy when compared to forest, off farm worker strategy. Lastly, households in Zomba, when compared to those in Lilongwe are more likely to choose the non farm business strategy over the forest, off farm strategy. Following the focus group discussions, households sampled from Zomba were closer to large trading centers compared to those sampled in Lilongwe.

Statistically significant variables in the mixed strategy are the education levels, number of livestock units and location in the district of Thyolo. These are as expected especially since the mixed strategy is composed of farm activities as well as skilled formal employment. Households above standard five of education in Malawi are more likely to be engaged in the mixed strategy than in the forest, off farm worker strategy. Households with more livestock units are also more likely to be in the mixed strategy than in the forest, off farm strategy. And lastly, households in Thyolo are more likely to be engaged in the mixed strategy than in the forest, off farm strategy.

These findings are consistent with literature on livelihood strategies in developing countries. For example similar findings in which female headed households were more likely to be associated with off farm worker and forest activities have been found in studies by (Babulo, Muys et al. 2008; Hatlebakk 2009). Large sized households have also been documented to engage more into diversified income sources and into strategies in which forest activities forms the livelihood portfolio ((Nkonya, Pender et al. 2004; Babulo, Muys et al. 2008).



The positive impact of higher education on the mixed strategy of is consistent with other empirical studies on the determinants of rural non farm income in Africa where education plays a barrier to entry into these high return strategies (Barrett and Webb 2001; Nkonya, Pender et al. 2004; Hatlebakk 2009). Geographical location variables also seem to play a crucial role in the livelihood strategies household take on. This is similar to findings by Nkonya et al. (2004), in Uganda where they find that households in locations with proper roads are more likely to be engaged in non farm business activities.

Therefore, the above results confirm part of my hypothesis that households with less endowment of assets like education and livestock choose less profitable strategies like forest and off farm worker strategy. On the other hand, the hypothesis that households with less asset endowment of labor will choose an inferior livelihood strategy is rejected in the case of forest and off worker strategy. Instead households with more endowment of labor, particularly male labor will take on the off farm and forest livelihood strategy which is inferior to non-farm business strategy. This situation can be attributed to the fact that forest and off farm worker strategies have low entry and exit barriers ( unskilled labor and minimal capital investment) (Whiteside 2000; Angelsen and Wunder 2003). Therefore households will divert their surplus labor to these low return activities.

Also, the land endowment does not turn out significant in our model; however households with higher land endowment will less likely choose the non farm business strategy compared to the forest and off farm strategy. On the other hand, they are more likely to participate in the mixed strategy than in the forest and off farm worker strategy. This shows the prime importance of land ownership in any strategy involving farm activities (as in the mixed strategy).

From these regressions, the geographical location of a household is a crucial determinant of the livelihood strategy that the household takes on, particularly for the case of non farm business strategy. Apart from the household size and the sex of the household head, participation in the non farm strategy is significantly determined by being located in

Zomba when compared to Zomba. This could be attributed to the fact that Zomba district has a history of business related activities having been the initial capital of Malawi.

## 6.0 Conclusion and Implications

This paper investigates the livelihood strategies and the prevalence of poverty in central and southern Malawi using cross sectional data of 378 households in 2009. Applying a combination of factor and cluster analysis, poverty indicators and the multinomial logit model, the paper identifies the major livelihood strategies in Malawi. It then determines the inferior and superior strategies and finally determines the factors limiting household's choices into higher return strategies.

In the identification of livelihood strategies using the labor and income shares and in employing factor and cluster analysis to both approaches, I find contrasting results. The labor share approach identifies five livelihood strategies; *on farm food, livestock and skilled non farm strategy, on farm food/non cash crop strategy, non farm forest and skilled employment, non farm forest activities and on farm food, livestock/ non cash crop strategy*. Enterprises, other crops, tobacco production and casual work on other people's farm are not livelihood activities in any of these strategies. On the other hand, the income share approach identifies three distinct livelihood strategies; *the non-farm business strategy, the mixed strategy and the forest and off farm worker strategy*. Apart from the production of other crops, all the other livelihood activities (forest, casual work on other people's farm, maize, tobacco, formal employment, livestock and enterprises or business) are a part of these strategies. I attribute this difference to the fact that the information collected on labor shares may have been a result of how the households had been allocating their labor in the subsequent years (panel data) while that for the net income shares is restricted to 2009 only. Consistent results from these two approaches would therefore require further empirical investigation using panel data. Additionally, the production of other crops is not a livelihood activity in any of the strategies. I attribute this to the possibility of lack of variation in participation amongst the households (almost all households were involved in it) yet factor analysis groups variables based on their

variations. For subsequent analysis therefore, I used the strategies identified using the income shares. This is because the strategies identified under this approach include all the activities found in Malawi particularly casual work on other people's farms, maize and tobacco production which are important livelihood activities from reviewed literature.

From the three strategies identified in the income share approach and which I use for the subsequent analysis, this paper reveals that the forest and off farm worker (commonly referred to as ganyu in Malawi) strategy is the inferior strategy associated with the highest level of poverty. I find that the non-farm business strategy offers the highest returns followed by the mixed strategy and lastly the forest and off farm worker strategy. Literature also links non farm activities as having higher returns than farm activities (Barrett and Webb 2001; Brown, Stephens et al. 2006). For forest activities and off work casual labor which have less entry and exit barriers in terms of skills and initial capital investment, low returns are always expected (Whiteside 2000; Angelsen and Wunder 2003). Additionally, the use of TIP curves of poverty also show that the non-farm business strategy has the least incidence, intensity and inequality of poverty while the forest and the off farm worker strategy have the highest prevalence of poverty.

As regards the determinants of livelihood choices, this paper reveals that female headed households when compared to their male counterparts were less likely to take on the high return non-farm business strategy as compared to the forest and off farm strategy. This is attributed to the possibility that they lack the necessary resources needed for the initial investment into the business strategy. They therefore opt for a strategy like forest and off farm worker strategy which has low entry and exit barriers. Additionally, they may be more concerned about the short term monetary benefits to meet the consumption needs of their households. The forest and off farm worker strategy because of less entry barriers as mentioned earlier provides this pathway for them.

I also find that the education level and possession of livestock are important determinants of whether households engage in the high return mixed strategy or the low return forest and off farm worker strategy. I attribute this to the fact that the mixed strategy consists of

formal employment which requires high skills and the livestock activities which requires livestock endowment. Households with low endowment of these assets are therefore rationed out of this high return activity. They end up choosing the low skilled forest and off farm worker strategy.

Regarding the asset endowment, I find interesting results in which households with more endowment of labor particularly male labor are more likely to indulge in the low return forest and off farm worker strategy when compared to the high return mixed strategy. This could be attributed to the low entry and exit barriers in the former such that labor surplus households find it easy to divert their excess labor into this strategy.

Lastly, I find that the geographical location of households particularly in the districts of Zomba and Thyolo when compared to Lilongwe are important determinants of whether rural households engage in the non-farm business or the mixed strategy. Zomba district was initially the old commercial town of Malawi and could be a reason why households in that region were more likely to be engaged in the business strategy than in the forest and off farm worker strategy.

Overall, evidence from this paper shows that even though majority of the rural households in Malawi may be below the poverty line, the poorest households will be found in the forest and off farm worker strategies. Therefore, any efforts aimed at poverty reduction should direct their resources to this sub group. The policy relevant binding constraints to their entry into other relatively high return livelihood strategies have been found to be education, gender, ownership of livestock and geographical location. It therefore becomes vital for government efforts to be directed towards education of this sub group of the population and to redistribute assets like livestock to them. Most importantly however, is to try and create a balance in the districts in terms of infrastructural access such as roads and markets.

The major limitation of this paper is that it uses cross sectional data to make conclusions on livelihoods and the prevalence of poverty amongst the livelihood groups. The use of

cross sectional data in such analysis may not however reflect whether the households are in transitory or chronic poverty. Nevertheless, conclusions from such an analysis provide good insights and implications for poverty reduction programmes and policies.

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## Appendix 1:

Table 20: Summary statistics of the variables used in the regression

<i>Variable</i>	<i>Overall Sample</i>			<i>Forest and off farm strategy</i>			<i>Non farm business strategy</i>			<i>Mixed strategy</i>		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
<b>Human Capital</b>												
<b>hhsz</b>	5.29 (2.042)	1	12	5.457 (2.092)	1	12	4.486 (1.721)	1	9	5.327 (2.065)	2	10
<b>hhdlabor</b>	3.092 (1.359)	0	7.9	3.170 (1.404)	0.8	7.9	2.851 (1.147)	0.8	6.7	3.146 (1.393)	0.8	6.1
<b>highesteduc</b>	0.402 (0.491)	0	1	0.363 (0.482)	0	1	0.410 (0.495)	0	1	0.577 (0.499)	0	1
<b>hhage</b>	46.342 (15.919)	16	85	47.311 (15.770)	16	85	45.73 (15.067)	23	85	44.56 (16.650)	21	85
<b>hheadsex</b>	1.25 (0.445)	0	1	1.273 (0.466)	0	1	1.179 (0.386)	1	2	1.211 (0.412)	0	1
<b>Physical capital</b>												
<b>Landsize</b>	1.077 (0.982)	0.03 4	10.057	1.112 (0.977)	0.034	10.057	0.862 (0.500)	0.115	2.72	1.143 (1.380)	0.053	9
<b>realassetval</b>	9848.125 (26704.0)	4720 49	311712 .4	10782.12 (29179.28)	- 46634.38	311712	5501.861 (14875.15)	- 47204.19	73265. 6	14075.16 (30816.99)	-182105	1639967
<b>tlunits</b>	1.265 (2.011)	0	17.18	1.104 (1.716)	0	14.2	1.277 (2.237)	0	17.18	1.953 (2.720)	0	12.2
<b>Shocks</b>												
<b>anyshock05</b>	0.236 (0.425)	0	1	0.235 (0.425)	0.282 (0.453)	0.154 (0.364)	0.282 (0.453)	0	1	0.154 (0.364)	0	1
<b>Anyshock06</b>	0.229 (0.421)	0	1	0.236 (0.425)	0.244 (0.432)	0.173 (0.382)	0.244 (0.432)	0	1	0.173 (0.382)	0	1
<b>Anyshock07</b>	0.330 (0.471)	0	1	0.321 (0.468)	0.372 (0.486)	0.333 (0.476)	0.372 (0.486)	0	1	0.333 (0.476)	0	1
<b>Anyshock08</b>	0.645 (0.479)	0	1	0.650 (0.480)	0.603 (0.493)	0.712 (0.457)	0.603 (0.493)	0	1	0.712 (0.457)	0	1

	Overall Sample			Forest and Off farm strategy			Non farm Business strategy			Mixed startegy		
Variable	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
<b>Anyshock 09</b>	0.648 (0.478)	0	1	0.642 (0.480)	0.615 (0.490)	0.731 (0.448)	0.615 (0.490)	0	1	0.731 (0.448)	0	1
<b>Location</b>												
<b>Thyolo</b>	-0.135 (0.342)	0	1	0.103 (0.304)	0	1	0.167 (0.375)	0	1	0.25 (0.437)	0	1
<b>Zomba</b>	0.222 (0.416)	0	1	0.200 (0.401)	0	1	0.320 (0.470)	0	1	0.212 (0.412)	0	1
<b>Chiradzulu</b>	0.093 (0.290)	0	1	0.085 (0.280)	0	1	0.115 (0.322)	0	1	0.077 (0.269)	0	1
<b>Machinga</b>	0.130 (0.336)	0	1	0.137 (0.3444)	0	1	0.141 (0.351)	0	1	0.077 (0.269)	0	1
<b>Kasungu</b>	0.233 (0.423)	0	1	0.286 (0.453)	0	1	0.090 (0.287)	0	1	0.173 (0.382)	0	1
<b>Lilongwe</b>	0.391 (0.188)	0	1	0.188 (0.392)	0	1	0.167 (0.375)	0	1	0.212 (0.412)	0	1

Variable names are as described in Table 2. Figures in parenthesis are standard errors

Continued from the previous page

## Appendix 2:

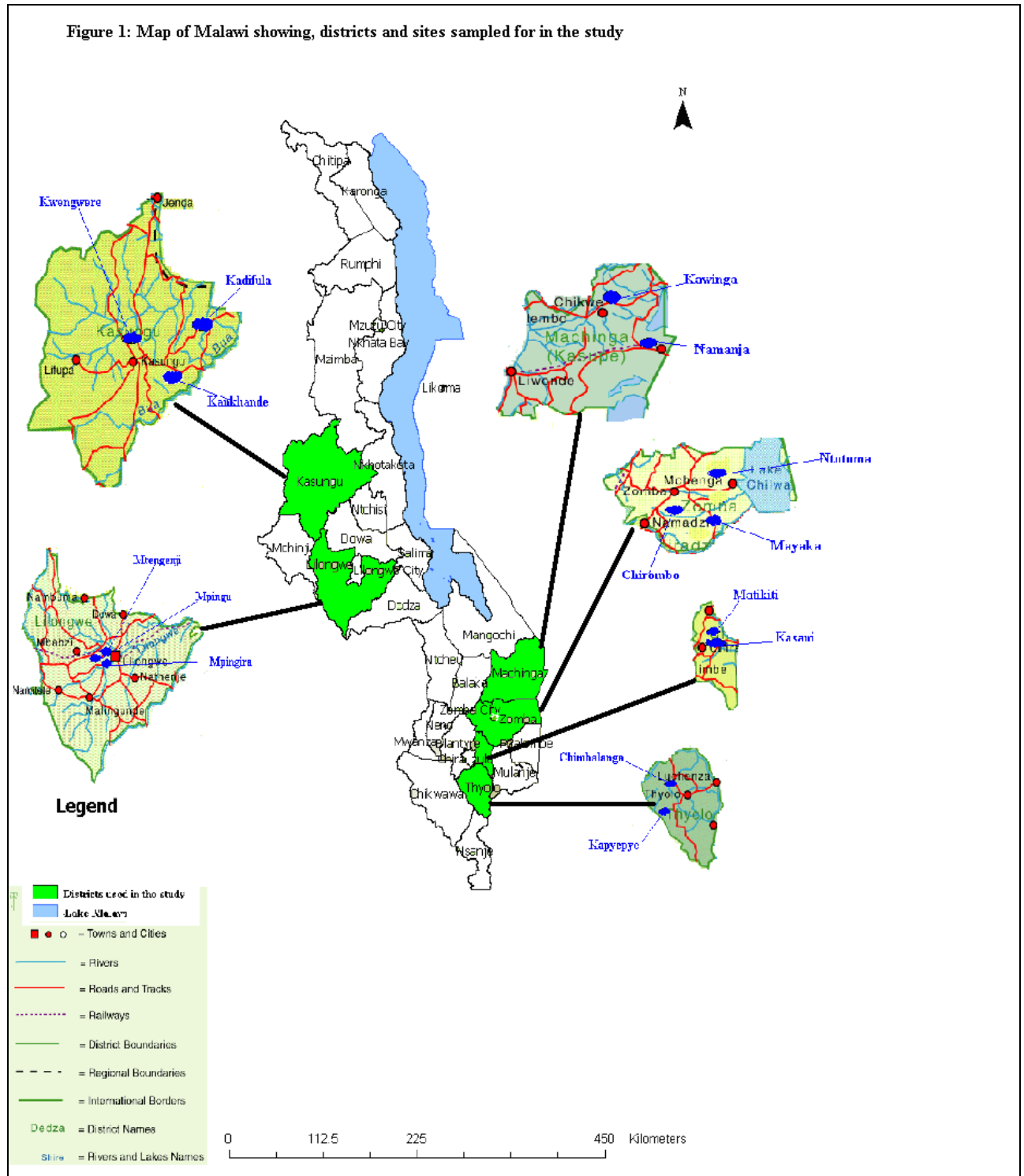


Figure 5: Map of Malawi showing the study sites

Questionnaire number

## Appendix 3

NOMA

(2009)

Household Questionnaire

HOUSEHOLD IDENTIFICATION	NAME	CODE
Household head		
Name of village		
Traditional Authority		
District		
Region		
Name of interviewee		Sex      1= Male 2=Female
Enumeration area		
Residence area	Husband's village	
	Wife's village	
	Neutral Village	
Name of Enumerator		
Name of data entry		
Date of interview	Date:...../...../2009  Start time:.....:.....  Finish time:.....:.....	Checked by:  .....  Approved:

	.....
Reasons for not conducting interview:	Household location GPS Coordinates:  N.....  E.....

**A. Provide the details of each household member**

Member ID	Name of household member	Sex	Relationship with HH head	Marital status	Age	Education			Main occupation	How many months did the name live here in the last 12 months A8	If they left the home when did they live? A9	How many times did the name face serious illness in the past season for more than 3 weeks. A10
						A6	Number of years of schooling (a6.1)	Highest class attended (a6.2)				
01												
02												
03												
04												

Code

A2 1=female 2=male

A3 1= husband 2= wife 3= son 4= daughter 5= Grandchild 6=Brother 7=sister 8=neice 9= nephew 10=other relatives (specify)

A4 1=Married 2=Widowed 3=Divorced 4= separated 5=Never married

A6.3 0=none 1=std 1-4 2= std 5-8 3= Attend sec 4=MSCE 5=Techn. Colle 7=University

A7 0=none 1= Farming 2=bussiness 3=ganyu (labour) 4=Salaried work 5=schooling 6=Unemployed 7=other (specify)

A10 0=none 1=once 2=twice 3=three times 4=whole season

**This question is for new households in the survey those that got married after July 2007.**

**B. Marital status and residential areas**

ID	Name of wife(s)  B1	Name of husband  B2	When did you get married? B3	Number of children  B4	Residence				
					District of origin  B5	Village of origin  B6	Village of residence B7	If B6 and B7 are different,	
								When did you come into this area? B8	Distance from village of origin B9
								Distance	Unit
							1= Wife's village 2=husband's village 3=neutral village		0 if B6 and B7 is same

**This question is for new households in the survey those that got married after July 2007.**

**Br. Major resources brought into marriage**

At marriage what did		What resources did parents have		Did husband pay Chitengwa?	If yes, how much?	
Husband bring Br1	Wife bring Br2	Husband's Br3	Wife's Br4	1=yes 0=no Br5	Br6 Cash	Br6 Kind

**C. Social economic characteristics**

Quality of Main house C1		Toilets ownership and type C2		Source of water C3		Source of energy C4				
Walls C1a		Does house hold own a toilet C2a (0=No, 1=Yes)		Source C3a		Source lighting C4a				
Roof C1b		Kind of toilet C2b		quality C3b		Source cooking C4b				
Floor C1c		If no toilet, what is used C2c		availability C3c						
Windows C1d										
Type of house				Water source C3			Energy C4			
Walls C1a	Roof C1b	floor C1c	window sC1d	Kind of toilet C2	Altenative toilets	source	quality	Availability	lighting	cooking
1= Poles and mud 2= Sundried walls 3= compacted earth 4=burnt bricks walls 5= plastered and painted walls	1=Grass Thatched 2=Iron sheets 3=Tiled 4=cement sheets	1=ce ment 2=mu d	1=wood en 2=glass 3=grass 4=witho ut window s 5= opening 6=other s	1=Flush sewer system 2=Flush septic 3=latrine with san plat 4=Traditional latrine 5=VIP latrine	1= bush 2= river/ lake 3=neighbours 4=others	1=river/lake 2=protected well 3=unprotected well 4=borehole 5=Communal piped 6=household piped 7=other	1= bad 2=modera te 3=good	1=All year round 2=In wet season only 3=some breakdowns	1=Electricit y 2=paraffin 3=candles 4=wood 5=grass 6=torch 7=other	1=firewo od collected 2=purcha sed firewood 3=made charcoal 4=purcha sed charcoal 5=paraffi n 6=electri city 7=crop residues 8=others



**D Assets owned by the household**

Items	Does your household own the following items D1 1=yes 0=no (go to D6)	How many items do you have?  D2	How much did you pay for it? (MK)  D2.1	When did you acquire them?  (year)  D3			When acquired, was the item new?  D3.1  1=yes 0=no			If you were to sell them today what will be the price?  (MK)  D4		
Car												
Ox cart												
Bicycle												
Wheelbarrow												
Hoe												
Panga												
Axe												
Sickle												
Handsprayer												
Treadle pump												
Engine pump												
Bed												
Chair table												
Chair sofa												
Ridger												
Table												
Sewing machine												
Radio												
Plough												
Pressing iron												
Television												
Cellphones												
Others (specify)												

D Assets owned by the household Cont'

Items	Did you lose or sell any item last year? 1=yes 0=no D5	Did you own any in the last five years? D6 1=yes 0=no If no go to D10	If yes what happened? D7	When did this happen? (year) D7.1	If sold why? D8	If sold what was the price? (Mkw) D9	Do you plan to buy any of these this year? 1=yes 0=no D10
Car							
Ox cart							
Bicycle							
Wheelbarrow							
Hoe							
Panga							
Axe							
Sickle							
Handsprayer							
Treadle pump							
Engine pump							
Bed							
Chair table							
Chair sofa							
Ridger							
Table							
Sewing machine							
Radio							
Plough							
Pressing iron							
Television							
Cellphones							
Others (specify)							
			1 =lose 2 =sell 3 =stolen 4 =other(specify)				

E. Time use and labour

Member ID	What day of the week was yesterday?  E1	How many days did you spend collecting firewood last week?  E6	How many hours did you spend collecting firewood yesterday?  E7	How many hours yesterday did you spend on household agricultural activities?  E9	At peak time during the agricultural season, how many hours per day did you engage in ganyu?  E11	At peak time during the agricultural season, how many hours do you spend in the field? E12
1						
2						
3						
4						
5						
6						
7						

E2. Proportion of Labor allocated to the different activities in a Year (Out of 20 matchsticks, how many would you give in terms of labor allocated to the following Activities)

Member ID	Household Activities E21	Collecting Firewood E22	Forest Activities E23	Maize Fields E24	Tobacco Fields E25	Other Agricultural Activities E26	Non Agricultural activities E27

Indicate distance (in km) from home to forest thinning or forest clearing area: \_\_\_\_\_

Indicate distance (in km) from home to firewood collection area: \_\_\_\_\_

Indicate distance (in km) from home to forest based area of wage.....

Wage per hour of forest based wage work.....

F.How many parcel does the household have?.....  
 Ask for each plot the household owns or rents in or rents out or fallow

Parcel ID	Plot ID	Name of plot	Distance from home to the plot	What is the size of your plot?		Physically measured size with GPS (meter square)			What is the general texture of the soil?	What is the slope of the plot?	What is the general fertility of the plot?	How did you acquire this plot?	If you were to sell this plot today how much could you sell it for?
				Unit of measure F3	Amount F4	Coordinates N/S F5	Coordinates W/E F6	Size F7					
		F1	F2						F9	F10	F12	F13	F14
	1												
	2												
	3												
	4												
	5												
	6												
	12												
	Give name of crop grown or fallow See codes on FC								1=sandy 2=loam 3=clay	1-flat 2-slight 3-steep	1-very fertile 2-average 3-not fertile		

Codes F13= 1=granted by local leaders, 2=Inherited from mothers side (wife) , 3=Inherited from fathers side(wife), 4=Inherited from mothers side (husband) , 5=Inherited from fathers side(hasband) ,6=Rented, 7=purchased , 8=farming as tenant

F15 If you need more land for cultivation do you have any available for you?

1-Yes.....How?.....

2-No..... why?.....

F16 If you were to buy land how much will you be willing to pay for one acre? (MK).....

Fs. -Security of the plots

Plot ID	Who will inherit this plot from you Fs1			Under what circumstances can you stop cultivating this plot Fs2			Who can grab the land away from you? Fs3			What are you doing to ensure that you don't lose the plot? Fs4		

Fs1 1=Sons, 2=daughters, 3=both (children) , 4=brothers, 5=sisters, 6=others,

Fs2 1=Divorce, 2=Death of spouse, 3=Emmigration, 4= end of contract, 5= none 6=others

Fs3 1=Village Chief, 2=Brother, 3=Brother in law, 4=Sister in law, 5=none, 6= owener, 7=government, 8= uncle, 9= others

Fs4 1=Plant tree, 2=Plant vertiva and 3=rhodes grass, 4= registered, 5=none, 6=others

Fri. If there is a plot that was rented in answer table below

Rented in plot (wobwereka)

Plot ID	Did you rent in land last growing season (2008/09)? Fri1	Why did you rent the plot? Fri2	Duration of rent Fri5	Type of contract Fri6	Will contract be renewed for the coming season? Fri7	Sharecropping		Fixed rent How much did you pay for the plot? Fri10
						Rate of share cropping paid Fri8	How much did you pay for the plot if sharecropping? Fri9	
	no yes	1=increase land 2=grow cash crop 3=others (specify)	Number of seasons	1-Fixed rent 2-sharecropping 3-borowing free	0= no 1= yes 2=maybe			

Fri7: Give reason for above answer .....

Fro : Rented out plot (wobwereketsa)

Plot ID	Did you rent out the plot? 1=yes 0-no  Fro1		Why did you rent out the plot?  Fro2	To whom did you rent out the plot?  Fro3	Duration of rent  Fro5	Type of contract  Fro6	Will contract be renewed this coming season?  Fro7	Sharecropping		Fixed rent How much did get from the rent  Fro10
	Year before last (2007/08)	Last year (2008/09)						Rate of share cropping received  Fro8	How much did you get for the plot if sharecropping?  Fro9	
			1=cash 2=assist others 3=excess land 4=others		Number of seasons	1-Fixed rent 2-sharecropping 3-borrowing free	0= no 1= yes 2=maybe			

Fro3 1=person from same village, 2=other village, 3=immigrant, 4=urban dweller

FR07: Give reason for above answer .....

Fsb: Plot bought

Fss:Plot sold

	Where did you buy the plot?	Why did you buy, the plot?	How much did you pay for the plot?
	Fsb1	Fsb2	Fsb5
	1=same village 2=other village	1=secure more land 2=grow cash crop 3=grow food crops 4= seek fertile land 5=others (specify)	

Plot ID	To whom did you sell the plot?	Why did you sell, the plot?	How much did you get for the plot?
	Fss1	Fss2	Fss5
	1=person from same village 2=other village 3=immigrant 4=urban dweller	1=cash 2=assist others 3=more land 4=change in activity 5=others (specify)	

c: Crops grown on each plot

Plot ID	What crops were grown on this plot last season (2008/09)?				Identify type of Cropping System	What factors are taken into account in making decision on what crops to grow on each plot or leaving the plot fallow? (in order of priority starting with the most important)	What major reasons did the household have for monocropping or mixed cropping? (in order of priority starting with the most important)						
	1st Fc1	2nd Fc2	3rd Fc3	4th Fc4							Fc5	Fc7	
1													
2													
3													
4													
12													
	Crop codes 0 fallow 1 Maize Hybrid 2 Compost Maize (OPV) 3 Maize Local 4 Beans Dry 5 Beans Green (Zitheba) 6 Peas 7 Ground nuts 8 Tobacco 9 Cassava 10 Pigeon peas 11 Irish potato 12 Sweet Potato 13 Cabbage		14 Tomatoes 15 Onions 16 Lettuce 17 Rape 18 Mpiru 19 Pumpkins 20 Garlic 21 Cucumber 22 rice 23 Millet 24 sorgum 25 sugarcane 26 soyabeans 27 other (specify)		1= Mixed cropping 2= Monocropping 3= Intercropping	1= Land availability 2= Labour availability 3= Prevailing market prices 4= Seeds, fertiliser, availability 5= Meeting household basic consumption needs Credit 6= Past crop performance (in previous seasons 7= Expected rainfall patterns. 8= Crop rotation 9= Other (specify)	1= Maximise revenue from land 2= Allow positive complementarity effects among crops (e.g. N-fixing, ) 3= Save time and labour in crop management 4= To produce quality standards for exclusive for marketing 5= other						



Fer:Soil erosion and control measure

Plot ID	Do you have natural trees on the plot?  1=yes 0=no  Fer1a	How many trees are there?  Fer1b	Name any 3 common natural trees on the plot  Fer1c	Name trees that were planted on the plot  Fer2		How much soil erosion was there on your plot last year (2008/09)?  Fer3	What soil erosion control measures have you used on the plot?  Fer6			What is the major reason for applying conservation measures?  Fer8		What costs are associated with applying this technique? (MKV)  Fer9		
				Tree  Fer2a	How many  Fer2b									
1														
2														
3														
4														
12														
			Write the chichewa names in the box and below the table	0= none 1- Gmelin a 2- Eucalyptus 3- Mango 4-Cacia siamea 5- Oranges 6-others (specify )		0-none 1- slight 2-moderate 3-severe	1=vertivar/ elephant grass 2=Contour bunds 3=contour ridges 4- box ridges 5- ridges across the slope 6-terraces 7- manure 8- none 9- others	1-improve soil quality 2-incentives given 3-advise from extesion workers 4-increase yeild 5-control soil erosion 6-Other Specify.....						

Plot ID	Crop Code	SEEDS				PESTICIDES					FERTILISER						
		Source	Type / Variety	Amount G4		Cost	Source	Type/ Name	Amount G8		Cost	Type/ Name	Source	Amount G12		Cost	Did you use subsidized fertilizer on this plot? 1=yes 0-no G14
				Quantity	Unit				Quantity	Unit				Quantity	Unit		
G1	G2	G3			G5	G6	G7			G9	G10	G11			G13		
1																	
2																	
12																	

G.Input use

List crops and inputs on each plot in the last cropping season (2008/09)

G2, G6 G10; 1=own 2=bought(own money) 3 bought (credit) 4= bought(coupon) 5 =gift 6=others

G9;1=CAN 2= Urea, 3=23:21:0, 4=20:20:0, 5=D compound, 6= super D, 7= SA, 8= others (specify)

Gi: Input use cont

Plot ID	Did you apply any manure on this plot?  1=yes 0-no  G15	Manure					
		What was the type of manure?  G16	Amount of manure G17		Source of manure  G18	If bought how much did it cost (MK)  G19	How many days did it take you to apply the manure?  G20
			Quantity	Unit			
1							
2							
3							
4							
		1=Compost 2=wastes 3=livestock 4=green manure 5= tobacco stems 6=others		1= basket 2= oxcart 3=pail 4=wheel barrow 5=bags (50kg) 6=bags (90kg) 7= bales 8=Nkhok we 9= lichelo ( basin) 9=others	1 self made (compost) 2 own animla manure 3 given by friend relative 4 bought 5 other		

Did you have visits from extension staff last season (2008/09)? 1-Yes 0-No

.....  
If yes how many time?

.....  
What advice did you receive from the extension staff?

.....

Labour use on plots

For each of the plots and crops cultivated by the household indicate how many man-days did household member work in the following activities within the last season (2008/09)

Plot ID	Land preparation G21		Planting G23		Fertilizer application G25		Weeding G26		Harvesting G27	
	No of members	No of days	No of members	No of days	No of members	No of days	No of members	No of days	No of members	No of days
1										
2										
3										
4										

Hired Labour						
Plot ID	Did you hire any Nganyu labour to work on this plot? 1=yes 0=no G28	Why did you hire in labour on this plot?  G29	For how many man days did you hire the labour?  G30		How much did you pay for the labour?	
			No of workers	No of days	Cash G31	In kind G32
1						
2						
3						
4						
5						

H. Harvest

How much did you harvest last season (2008/09)

Plot ID	Crop code	Harvest 2008/2009							Indicate the state of the yield in the 5 past years.	Indicate the major reasons for the change
		1st		2nd		3rd		4th Others		
		Quantity	Unit Code	Qunatity	Unit code	Quantity	Unit code	Estimat ed value		
H1	H2	H3	H4	H5	H6	H7	H8	H10	H11	
1										
2										
3										
4										
5										
6										
	Use Crop codes									

Code H3, H5, H7: 1= basket 2=oxcart 3=pail 4=wheelbarrow 5=bags (50kg) 6=bags (90kg) 7= bales 8=Nkhokwe 9= lichelo ( basin) 10=others  
 H10: 1=increasing 2=decreasing 3=constant

Hs: Sales and markets for crops and forest products

		If answer to Hs2 is YES						If answer to Hs2 is NO	
Crop code	Did you sell your crops last season (2008/09)? 0 = No 1 = Yes  If no go to Hs11 Hs2	How much of the harvest was sold?		Distance from home to the market	Type of market	Who bought your farm produce?	What was the total value of money you got from the sales?	How are/were prices determined	Why wasn't some of their produce sold?
		Qty	Units						
Hs1		Hs3	Hs4	Hs6	Hs7	Hs8	Hs9	Hs10	Hs11
				Walking 5 Km/hrs  Oxcart 4km/hr  Bicycle 15km/hr					

Hs4 1= basket, 2= oxcart, 3=pail, 4=wheelbarrow, 5=bags (50kg), 6=bags (90kg), 7= bales, 8=Nkhokwe, 9= lichelo ( basin), 9=others  
Hs7 1= Farm-gate, 2= Local (primary) markets, 3= District Assembly markets, 4= Urban markets, 5 =Auction floor, 6=Other (specify)  
Hs8 1= small scale traders, 2= NGOs, 3=Other villagers, 4=Wholesale buyers, 5=ADMARC, 6=NASFAM, 7= Auction, 8=Other (specify)  
Hs10 1= Negotiated, 2=Predetermined by GoM/ADMARC, 3=Set by the traders, 4=Set by the farmer, 5=other (specify)  
Hs11 1= Harvested too little, 2= Prices were too low, 3= Didn't know where to sell, 4= There were no potential buyers, 5= Other (Specify)

Ys:Forest Products, Sales and markets

				If answer to Ys2 is YES				If Ys2 is NO		Transport costs		State of yield in 5 years	Reasons for the change		
Product code	Estimate the amount of forest products	Did you sell your forest products last year (2008/2009)?	Harvest was sold?		Average price of the product	Distance to market	Type of market	Total value sales		Why wasn't some products sold?	Estimate the value not sold	Means of transport to the market	Average total cost of transport	Ys 14	Ys 15
			Qty	Units											
Ys1	Ys1.1	1=yes 0=no  Ys2	Ys3	Ys4	Y5	Ys6	Ys7	Ys8	Ys9	Ys11	Ys12	Ys13	Ys 14	Ys 15	

Ys1 1= firewood, 2= charcoal, 3=timber or other wood , 4=food from the forest, 5= medicine, 6= forage 7= other specify

Ys4 1= basket, 2= oxcart 3=pail 4=wheelbarrow 5=bags (50kg) 6=bags (90kg) 7=headload 8=others

Ys6 Walking 5 Km/hrs Oxcart 4km/hr Bicycle 15km/hr

Ys71= Forest-gate, 2= Local (primary) markets, 3= District Assembly markets, 4= Urban markets, 5 = Other (specify)

Ys91=home consumption 2=lack of market 3=other (specify)

Ys12 1=Head load, 2 Ox cart, 3 Bicycle, 4 Vehicle, 5 Wheel barrow, 6 others

Ys14 1=increasing 2=decreasing 3=constant

H. Marketing. (For each crop that was sold, please ask)

Crop code	What was the means of transport to the market? Hs12	What was the cost of transport to the market? Hs13	When did the household sell the crop? Hs14	Why did the household opt to sell/store at that period?		If they stored, what kind of storage mechanisms did the household use? Hs16	How long was the produce stored in months? Hs17	Did you incur any problems when you stored your crops for sale? Hs18		Did you grade your produce before selling? Hs19
				Sell Hs15a	Store Hs15b					
Use crop code	1 Head load 2 Ox cart 3 Bicycle 4 Vehicle 5 Wheel barrow 6 others		1= Immediately after harvest 2= They stored and sold at later date 3=Sold some after harvest but stocked some for sale at later period 4= Other	1=Household needed an immediate source of income 2=To take advantage of prevailing high prices at the time 3=Lacked storage place/ mechanism 4= Wanted to wait for better prices after harvest season 5=Others (specify)		1=Granary (Nkhokwe) 2=In the home kept in Bags, sacks, baskets 3=Late harvest 4=pit storage 5=Others (specify)		0=No 1=Theft 2= Loss of quality 3=Destruction by pests 4= Prices never went up 5= Other (specify)	0= No 1= Yes	



FO: Farmer Organisations

Fo1: Do you belong to a farmer farming organisation? 1=Yes 0=No If No go to Hm

If yes to Fo1						
What kind of organisation is it?  Fo2	How long have you been a member?  Fo3		Why did you join the organisation?  Fo4	What 3 important functions does the FO carry out?  Fo5		
	Years	Months				
1= Farmer cooperative 2=Farmer club 3=Association 4= Others (specify)				0= Nothing 1=Helps farmers access inputs on loan 2=Markets produce for farmers 3=Provides extension advice 4=Others (specify)		

Hm. Market Information

(NOTE: If they did not sell last season (2008/09) you can ask with reference to the years when they sold their produce in the past)

Crop code	Where did you source information about crop prices			Where did you source information about potential buyers and business partners?			Where did you source information about crop grades required on the market before you sell?			Was the information you sourced received reliable? 1=yes 0=no		Was it timely enough for you to make use of it? 1=yes 0=no		What costs were incurred to acquire this information?  (Mkw)		How did you use the information?	
	Hm1			Hm2			Hm3			Hm4		Hm5		Hm6		Hm7	
Use crop code																	

Hm1 –Hm3: 0= Nowhere, 1=Relatives and friends (other farmers), 2=Government offices, 3=Traders, 4=NGOs, 5=Companies (agro processors), 6=Extension workers,

7=Radio, 8=Newspapers, 9=Own market research, 10=Potential buyers, 11=Others (specify)

Hm7: 1= To make production decisions , 2= To make the decision whether to sell their produce or not, 3= To make decision where to sell, 4= To negotiate for better prices for their produce, 5=Others (specify)

Hm8: If the information was not reliable explain why. \_\_\_\_\_

Livestock ownership and livestock sales in the past 2 years

Livestock code	How many do you have now?	What is the estimated price if you were to sell today?		How many were sold?	When were they sold?		At what price were they sold? (Mkw)	Why were they sold?	How many were slaughtered and consumed in HH?	How many have been received?	How many bought ?	How many were stolen?	How many have died?		
		I2.1			I3	I4								I5	
		Young / old/ sick ones	Adult/ healthy ones			Years									Months
I1	I2							I7		I9		I10	I11	I13	I14
Cattle															
Goats															
Sheep															
Pigs															
Chickens															
Doves															
Guinea fowl															
Rabbit															
Duck															
Turkey															
Bees															
Others															

J. Access to credit

J10 Did you apply for or look for any loans in the past 12 months? 1=Yes 0 =No ....

J11 If you applied, were you given? 1=Yes 0 =No .....J12 If not given, state reason .....

J13 If didn't apply, why? .....

If J10 and J 11 are 1, fill the table below

Lo an No	Source of credit	What was the total monetary value of loan?	Interest rate on the loan	From where did the household obtain a loan in the past 12 months: relationship to person or name of institution	Kind of credit?  J3	In whose name was the loan received? (HH id)  J4	What was the main reason for obtaining the loan?  J7	If loan was used for inputs indicate the plots on which the input was used						
								Amount (Mkw)  J8			PlotID  J9			
J1	J1.1	J1.2	J1.3	J2										

J1.1: 1= formal 2=informal

J3: 1= cash 2=kind

K. Other sources of income  
K1. Off-farm wage employment

<p>K1a. Excluding Ganyu (For wage, salary, commission)</p> <p>At any time over the past 12 months, did any member of the household engage in formal employment? yes=1 <input type="checkbox"/> no=0 <input type="checkbox"/></p> <p>If No go to K1b</p>							<p>K1b. Ganyu Labor employment</p> <p>At any time over the past 12 months, did any member of the household engage in formal employment? yes=1 <input type="checkbox"/> no=0 <input type="checkbox"/></p>					
Who in the household was engaged in this employment?  K11	Who was the main employer for your main occupation in the last 12 months?  K12	For how long did this hh member work during the last 12 months?  K13		For how many days per month did normally do this work?  K14	Place  K15		What was the average salary per month?  (Mkw)  K16	Who in the household was engaged in ganyu labour?  K17	For how many total days did you do ganyu labour over the past 12 months?  K18	What was the average daily wage you received for working as ganyu over the past 12 months?  K19	How often within the last 5 years was the person engaged in this work?  K110	Why did the household engage in this activity?  K111
Member ID		Months	Weeks	Days	Specify name K15a	Code K15b		Member ID				
			1=week 2=month									

K 12 1- private company 2- individual 3- government 4- (parastatal) 5- MASAF or other public works program 6-Other (specify).

K 15b 1=Village 2=Other village same district 3=Town same district 4=Town other district

K110 1=very often 2=often 3=once

K 111 1= high off-farm income 2=not enough own farm income 3=excess time 4=other

K2. Household enterprises

Who in the household is responsible for this activity?  K21	What income - generating enterprises did individuals in your household operate over the past 12 months?  K22	From which month to which month do you usually operate this business?  K23	How many months within the last 12 months did you engage in the enterprise?  K24	Where do you operate the enterprise?  K25	How many years or months has this enterprise been in existence?  K26	What was the main source of start-up capital for this enterprise?  List up to 3  K27	How much did you invest in this enterprise?  K28	What was the average monthly revenue for the enterprise?  K29	What are the average (operational) costs per month?  K210	Why did the household engage in this activity?  K211
---	--	--	--	---	--	--	--	---	---	--

Household enterprises

Over the past month, has anyone in your household operated any non-agricultural income generating enterprise (business) which produces goods or services or has anybody in your household owned a shop or operated a trading business? (Fishing, making mats, bricks or charcoal; mason; firewood selling; metalwork; tailoring; repair work; food processing, fish marketing, petty trading (sales of handicraft, beverages, etc.))

YES...1 NO....2

Member ID		From	To	Months		Years K26a	Months K26b	K27 a	K27b	K27c				

K22 1=Fishing 2=making mats 3=bricks 4=charcoal; mason 5=firewood selling 6=metalwork 7=tailoring 8=handyman 9=food processing 10=fish marketing 11=petty

trading 12=sales of handicraft 13=beverages 14=others (specify)

K25 1=home, inside residence 2=home, outside residence 3=industrial site 4=traditional market 5=commercial area shop 6=roadside 7=other fixed place 8=mobile 9=other

K27 1= Loan/Gift from family friends 2=Sales of assets 3=Proceeds from other business 4=savings from Ganyu 5=savings from agriculture 6=other savings 7=Loan from

bank or other institution 8=Loan from money lender 9=Inherited 10=Other (specify) 11=None

K211 1 = high income from the enterprise 2 =not enough own farm income 3=excess time 4=other

K. Gifts received and given by the household

Over the past 12 months, did you or anyone in your household receive any gifts (in cash or in-kind) from any individuals (friends/family) outside your household? 1=yes 0=no K6	What was the total value of all cash received as a gift from individuals in the last 12 months? K7	What was the total value of all food received as a gift from individuals in the last 12 months? K8	What was the total value of all other in-kind gifts received from individuals in the last 12 months? K9

L.Expenditure in the household

Which of the following items did you buy or pay for in the last 7 days? L1a	Yes=1 No=0 L1a	How much did you pay for it? L1b	Which of the following items did you buy or pay for in the last month? L2a	Yes=1 No=0 L2a	How much did you pay for it? L2b

Food items for last 7 days			Non-food items for last month		
Maize (grain and flour)			Charcoal		
Rice			Paraffin or Kerosene		
salt			Public transport-bus fare,taxi fare		
soap			Clothes		
Sugar			Stationary items		
Cassava tubers and flour			Books		
Sweet potato			School fees		
Groundnuts			Medicines		
Vegetables			Funeral costs		
Meat			Other (specify)		
Fish					
Eggs					
Fruits					
Milk					
Cooking oil					
Tea					
Soft drinks					
Beer					
Beans					
other (specify)					

RS. Recent shocks to household welfare

Negative shocks are defined as sudden adverse events (NOT ANTICIPATED) that lead to a loss of household income, a reduction in consumption, a loss of productive assets, and/or serious concern about household welfare. Anticipated shocks such as death after a long illness, crop failure following a long dry spell or drought, etc will not be considered as shock in this study.

Has this household experienced ANY major shock since 2005

GO THROUGH THE ENTIRE LIST	Did you experience a shock this year? 1=yes 0=no	The year shock occurred	Note down the three most significant shocks you experienced for each year R2	Degree of coverage	Duration of shocks in weeks	Effect of the shock	Estimated total value of loss  (not for 11-14)	What did you do in response to this shock to try to regain your former welfare level?
	R1.1	R1.2		R3	R4	R5	R6	R7

1- Lower yields due to drought or flood 2-Crop disease or crop pests 3-Livestock dies or were stolen 4-Large fall in sale prices for crops 5-Household buisness failure 6-Loss of salaried employment 7-Non-payment of salary 8-End of regular assistance, aid, or remittances from outside HH 9-Large rise in price of food 11-Death of HH head 12-Death of working members of the HH 13-Illness or accident of household member 14-Death of other family member 16-Dwelling damaged, destroyed 17-Theft 18-Other (specify)	2005	1									
		2									
		3									
	2006	1									
		2									
		3									
	2007	1									
		2									
		3									
	2008	1									
		2									
		3									
	2009	1									
		2									
		3									

R3: 1=Own HH only 2=Some other HHs too 3=All HHs in community

R5: 1=Reduction in income 2=Reduction in assets 3=Both 4=Nothing

R7: 0=Nothing

1=Spent cash savings

2=Sold assests (tools etc)

3=Sold farmland

4=Sold animals

5=Sold more crops

6=Worked more (incl. other HH members, ganyu)

7=Started a new buisness

8=Removed children from school to work

9=Sent children to live with relatives

10=Went elsewhere to find work for more than one month

11=Borrowed money (relatives, bank, local money lender)

12=Received help (government, NGO, etc)

13=Reduced food consumption (smaller proportions, fewer meals per day)

14=Diversify food consumption (Wild foods, meal sharing, no meat or fish)



S. Social capital and welfare perceptions

	Questions	Answers	Codes
S1	All things considered, how satisfied are you with your life over the past 12 months?		1=very unsatisfied; 2=unsatisfied; 3=neither unsatisfied or satisfied; 4=satisfied; 5=very satisfied
S2	Has the household's food production and income over the past 12 months been sufficient to cover what you consider to be the needs of the household?		0=no 1=yes 2=reasonable (just about sufficient)
S3	Compared with other households in the village (or community), how well-off is your household?		1=worse-off 2=about average 3=better-off
S4	How well-off is your household today compared with the situation 5 years ago? If 1 or 3, go to S5. If 2, go to S6.		1=less well-off now 2=about the same 3=better off now
S5	If worse- or better-off: what is the main reason for the change?  Please rank the most important responses, max 3.		1=off farm employment 2=land holding (e.g., bought/sold land) 3=forest resources 4=output prices (forest, agric,...) 5=outside support (govt., NGO,..) 6=remittances 7=cost of living (e.g., high inflation) 8= civil strife, unrest 9=conflicts in village (non-violent) 10=change in family situation (e.g. loss of family member/a major bread-winner) 11= illness 12=good infrastructure (access, e.g. new road...) 13=other (specify):
S6	Do you consider your village (community) to be a good place to live?		0=no 1=yes 2=partly
S7	Do you in general trust people in the village (community) when cooperating on ...?		0=no 1=yes 2=partly, trust some and not others
S8	Can you get help from other people in the village (community) if you are in need, for example, if you need extra money because someone in your family is sick?		1=Definitely 2=Probably 3=Probably not 4=Definitely not
S9	About how many friends do you (HOUSEHOLD HEAD) have in your community these days? These are people you feel at ease with, can talk to about private matters or call on for help.		
S10	About how many friends do you/does your SPOUSE have in your community these days? These are people she/he feels at ease with, can talk to about private matters or call on for help.		
S11	In the past 12 months, how many people with personal problems have turned to you for any form of assistance?		

