

**DETERMINANTS OF RURAL POVERTY IN ZAMBIA; A HOUSEHOLD
LEVEL ANALYSIS USING EXPENDITURE AS PROXY OF WELLBEING.**

**A Research paper presented to the Department of
Agricultural Economics and Extension Education
of the University of Zambia.**

**By
Tionge Simbeye**

**In Partial fulfillment of the requirements for the
Degree of Bachelor of Agricultural Sciences.**

© Tionge Simbeye, 2009

ACKNOWLEDEGMENT

I owe a debt of gratitude to my supervisor Mrs. R. Lubinda for her support, encouragement, guidance and patience during the course of writing this paper. Many special thanks also go to Dr. G. Tembo whose direction and support was so cardinal without which this was not going to be a success today. It would be totally out of order to forget my acknowledgment of the Head of Department Dr. T. Kalinda, whose efforts in ensuring the progress of all final year students was necessary. I am also grateful to the bursaries committee, for the funding of this research paper. I would also like to thank my closest friends and colleagues, Kangwa Lubumbashi, Brian Siwale and most of all Kabenuka Munthali whose inspiration and encouragements during the rough times helped me to persevere and soldier on. Finally, to my family, I wish to say many thanks for their encouragement, financial support and ready hand of help in times of need.

TABLE OF CONTENTS

ACKNOWLEDGEMENT.....	i
TABLE OF CONTENTS.....	ii
LIST OF FIGURES.....	iv
LIST OF TABLES.....	v
LIST OF ACRONYMS.....	vi
ABSTRACT.....	vii
CHAPTER 1: INTRODUCTION.....	1
1.1 Background.....	1
1.2 Statement of the problem.....	2
1.3 Justification/rationale.....	3
1.4 General objectives.....	4
1.5 Conceptual framework.....	4
CHAPTER 2: LITERATURE REVIEW.....	7
2.1 Introduction.....	7
2.2 Definition.....	7
2.3 Progress on poverty reduction in Zambia.....	7
2.4 Modeling poverty: methods.....	8
2.4.1 Using rural household income survey data for poverty analysis: log-linear model.....	8
2.4.2 Determinants of poverty: Binomial and Polychotomous models.....	9
2.5 Expenditure determinants.....	10
2.5.1 Community level characteristics and relation to poverty.....	10
2.5.2 Regional level characteristics and their relation to poverty.....	11
2.5.3 Household characteristics and their relation to	12
CHAPTER 3: RESEARCH METHODOLOGY.....	15
3.1 Introduction.....	15
3.2 Study area.....	15
3.3 Target population.....	15
3.4 Data collection.....	15
3.5 Data analysis.....	15

3.5 Data analysis.....16

CHAPTER 4: FINDINGS AND DISCUSSIONS.....19

4.1 Introduction.....19

4.2 Demographic characteristics.....19

4.2.1 Population sample.....19

4.2.2 Household status (rural household heads).....20

4.2.3 Rural household age.....20

4.2.4 Level of education of rural household heads.....21

4.2.5 Household size.....21

4.3 Social and economic characteristics (rural households).....22

4.3.1 Main economic activity22

4.3.2 Off-Farm employment per household22

4.3.3 Total monthly expenditure23

4.3.4 Ownership of assets by household24

4.3.5 Rural household access to facilities.....24

4.4 Model estimation results.....25

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS29

5.1 Introduction.....29

5.2 Conclusions.....29

5.3 Recommendations.....30

REFERENCES.....31

APPENDIX.....33

LIST OF FIGURES

Figure 1: Frame work5

LIST OF TABLES

Table 1: Sample distribution of the 2004 LCMS dataset.....	19
Table 2: Sex of household head.....	20
Table 3: Percentage of household heads per given age range.....	20
Table 4: Years spent in school by the household head.....	21
Table 5: Size of household.....	21
Table 6: Principle economic activity.....	22
Table 7: Presence of off-farm employment per household.....	22
Table 8: Household monthly expenditure range (ZMK).....	23
Table 9: Variation in expenditure range.....	23
Table 10: Household assets.....	24
Table 11: Percentage of households for each given range of distance to facilities.....	25
Table 12: Model estimation results.....	26

LIST OF ACRONYMS

CSO	Central Statistics Office
CSPR	Civil Society for Poverty Reduction
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
HH	House Hold
LCMS	Living Conditions Monitoring Survey
MDGs	Millennium Development Goals
PSPR	Poverty Reduction Paper
SPSS	Statistical Package for Social Sciences and Statistics
UN	United Nations
WB	World Bank

ABSTRACT

DETERMINANTS OF RURAL POVERTY IN ZAMBIA; A HOUSEHOLD LEVEL ANALYSIS USING EXPENDITURE AS PROXY OF WELLBEING.

Tionge Simbeye
University of Zambia, 2009.

Supervisor
Mrs. R Lubinda.

Poverty remains an issue in third world countries. Zambia still lists among the poorest nations in the world. Government has continued to prepare poverty reduction strategy papers, and formulated several policies in the fifth national development plan of 2006 with the aim of poverty reduction, yet there still remains a challenge of effectively reducing the risen level of rural poverty. This research was aimed at providing more information on the factors related to rural poverty in Zambia.

The objectives of this research were to establish the level of living standards that rural population were facing, and to identify those factors strongly associated with rural poverty in Zambia, as well as give recommendations for solution.

The study used the Living Conditions Monitoring Survey rural household level data collected in 2004 to examine probable determinants of poverty status, employing a log-linear multi-regression model. Developing such a regression is motivated by considering a household production process that takes human capital endowments and constraints faced by a household and use them to produce well-being, proxied by expenditures.

The study found that the human capital variables Age of head, Sex of head are not significant determinants of expenditures, (p values of 0.275 and 0.753 respectively). Dependency ratio, Adult equivalence and household size are also not significant determinants of expenditures, (p values of 0.345, 0.505 and 0.47 respectively). Ownership of selected household assets Oxen, Plough, Tractor, Hummer-mill and Radio tested not significant, (p values of 0.518, 0.685, 0.376, 0.673 and 0.959 respectively). Only distance to hospital, input market and schools, as well as education of household head and title to land tested significantly as determinants of expenditure, (p values of 0.031, 0.002 and 0.02 respectively). Geographical location of household, also significantly affected household total expenditure, according to province.

It has been recommended that programmes that cover problems associated with isolation are critical, especially that the government of Zambia does not use the policy of pan territorial pricing. There is also pressing need for programmes that discourage households from withdrawing children from school. Programmes designed to provide off-farm income generation activities or services should be linked closely to agriculture. Further research should be done to investigate the regional factors that explain differences in expenditure patterns depending on the province of a rural household.

CHAPETER 1.0

INTRODUCTION

1.1 BACK GROUND

Poverty posses a major problem in most of the developing world, especially in sub-Saharan Africa. According to Walker, et al (2006), research on poverty has been a major growth area for social scientists over the past fifteen years. The adoption by UN member countries of the Millennium Development Goals (MDGs), the first of which calls for halving the incidence of poverty and hunger by 2015, has underlined the importance of such research. The statistics from the Living Conditions Monitoring Survey of 2006, as highlighted by the Minister of Finance and National Planning, indicate that 80% of the rural population is below the poverty line while in urban areas the corresponding figure is 34%. Considering this huge disparity in poverty levels between the country's rural and urban areas, it is expected of government to set parameters for equitable redistribution of these resources it hopes to 'unlock'. The satisfactory realization of the redistribution of resources and the promotion of rural livelihoods, are vital for the overall poverty reduction as they have positive implications on a country's economic development (CSPR 2008). Kozel (2006) observes that overall data suggest virtually no improvement in rural living conditions in Zambia since 1990s. Therefore, social research on rural poverty is cardinal to determining factors that are still causing the slow pace of poverty reduction in rural Zambia.

Further evidence from literature proves that rural poverty reduction has seemingly been difficult while urban poverty reduction accelerated between years 2004 to 2006. Urban poverty reduced from 58% to 37% while rural poverty varied between 80% and 84% (Zambian growth and poverty reduction, 2007). Consumer prices for staple food items increased during the period from January to May 2008 on average by 15.6% for mealie meal, while cassava and mixed beans increased by 14.2% and 29.9%, respectively. This is higher than the annual inflation rate reported by CSO for food items of 9.8% for April

2008 (Zambian Food Security Monitor, 2008), and is further exacerbating the current poverty situation as many can not afford the high cost of living. As of November 2008 rural poverty was reported to have risen from 75% to 80% (CPI, 2008). Bearing in mind that agriculture is key for rural livelihood, the reduction of funds allocated to agriculture by government from 8.8% of the total budget in 2007 to 5.8% this year 2008 does not work well for rural areas. Considering agriculture is one of the backbone economic sectors of Zambia, the civil society for poverty reduction (CSPR) advised government to recognize the role that agricultural productivity, particularly small scale farming, plays in economic growth. Improving food security and ultimately reducing poverty will require encouragement through more resource allocation to small-holder agricultural activities and programmes (CSPR, 2008).

Consumption expenditure and Income are the two commonly used estimates to assess poverty. This research seeks to demonstrate that expenditure survey data can be very informative in explaining not only the variation across households (HH) in the incidence and severity of absolute poverty. Expenditure survey data can also explain factors causing poverty, using a rural household consumption data set obtained from the Central Statistics Office (CSO).

1.2 STATEMENT OF THE PROBLEM

The pervasive nature of rural poverty is one of the reasons for the recent focus on poverty-alleviation policies by the Zambian government. In order for government and stakeholders (like FAO, World Vision International, CSPR) to make interventions that will yield fruitful results on poverty reduction, adequate knowledge is needed on what is causing rural poverty. It has been observed that some aspects are related to poverty for example house-head age, house-head occupation and distances to facility (LCMS, 2006).

Governments usually prepare a poverty reduction strategy paper (PRSP) to guide poverty reduction efforts. One major weakness in most African government's PRSP is lack of in-depth information for implementing and monitoring the strategy (Geda, et al. 2005).

Strategies aimed at poverty reduction need to identify factors that are strongly associated with poverty and that are amenable to modification by policy. This research uses household level data collected in 2004 to examine probable determinants of poverty status, employing the log-linear model. Such a regression is motivated by considering a household production process that takes human capital endowments and constraints faced by a household and use them to produce well-being, proxied by expenditures.

1.3 JUSTIFICATION/RATIONALE

The information generated from this research could help the government to realise its poverty reduction goals, by laying the foundation for analytical work aimed at an in-depth understanding of poverty, and by establishing benchmark conditions for poverty monitoring. Hence, it will determine from empirical research the factors responsible for the consistent rural poverty. This information may also be used to advise government and various stakeholders in policy formulation and plans to deal with rural poverty.

According to the civil society and poverty reduction strategy process in Zambia (2001), to achieve poverty reduction under the MDGs targets set for 2015, a GDP growth rate of between 6 to 8 percent is required on an annual basis over the intervening period but the projected growth rates of 5 percent, 5 percent and 5.5 percent for 2001, 2002 and 2003 respectively may be too modest. Further research may add knowledge on how to implement more effective policies for poverty reduction.

Climate variability commonly referred to as climate change is recently topping the list of agriculture development challenges being faced by the entire global community. Efforts to develop African economies and achieve the MDGs must contend with the increasing challenge of climate variability. Most scientists now do agree that global warming is inevitable, and will have major impacts on the climate worldwide and agriculture productivity, particularly in Sub-Saharan Africa. This natural aspect cannot be ignored, hence the need to speed up the pace of poverty reduction before climate change ultimately causes more harm, and this is through more research, such as this one.

1.4 GENERAL OBJECTIVES

The main objective of this study was to carry out an analysis of rural poverty using household (HH) consuming expenditure data.

Specific objectives were:

1. To establish the current level of living standards that rural population were facing.
2. To identify those factors strongly associated with rural poverty in Zambia and give recommendation.

1.5 CONCEPTUAL FRAME WORK

In this research, consumption expenditure is chosen as an indicator of well being. According to Aline, et al (2001), provided the information on consumption obtained from a household survey is detailed enough, consumption will be a better indicator of poverty measurement than income for the following reasons:

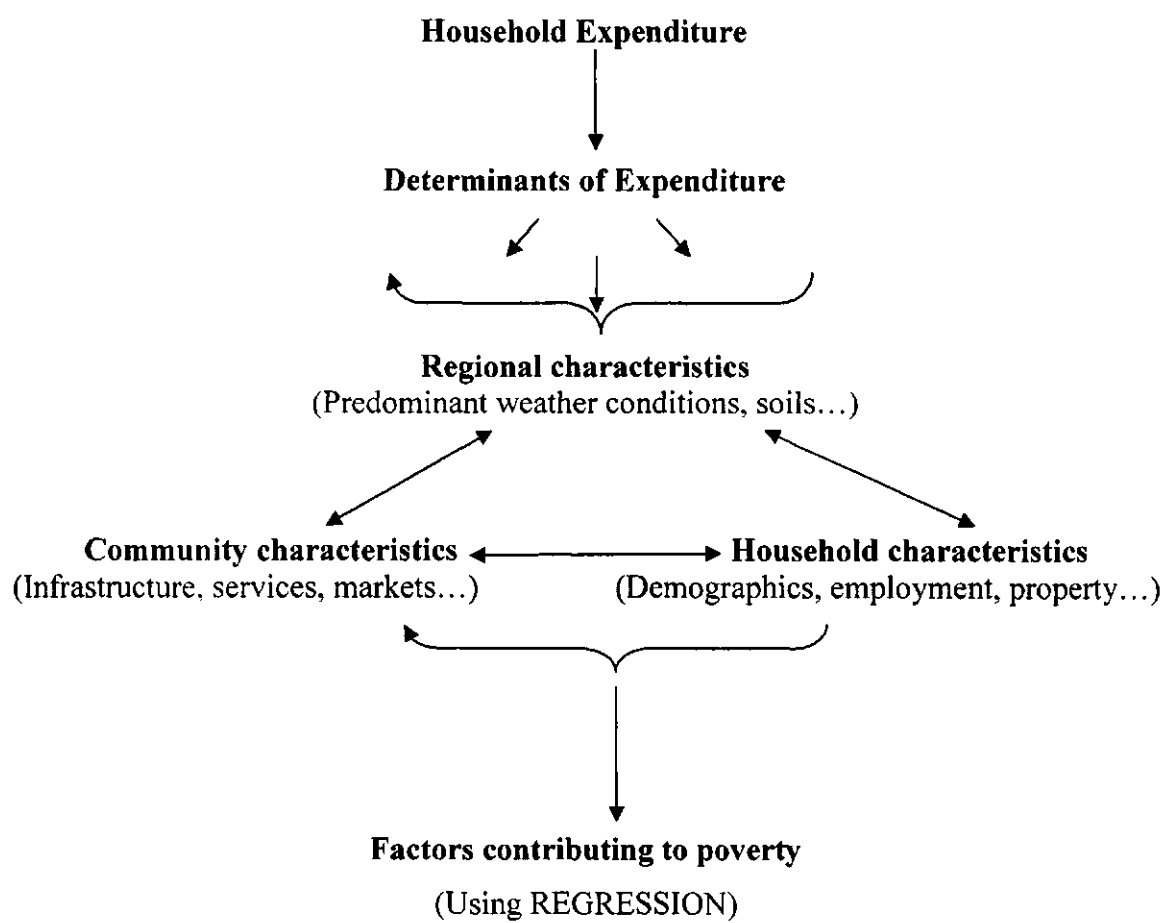
1. Consumption is a better outcome indicator than income. Actual consumption is more closely related to a person's well-being in the sense defined above, that is, of having enough to meet current basic needs. On the other hand, income is only one of the elements that will allow consumption of goods; others include questions of access and availability.

2. Consumption may be better measured than income. In poor agrarian economies, incomes for rural households may fluctuate during the year, according to the harvest cycle. In urban economies with large informal sectors, income flows also may be erratic. This implies a potential difficulty for households in correctly recalling their income; in which case the information on income derived from the survey may be of low quality. In estimating agrarian income, there is additional difficulty in excluding inputs purchased for agricultural production from the farmer's revenues. Finally, large shares of income

are not monetized if households consume their own production or exchange it for other goods and it might be difficult to price these. Estimating consumption has its own difficulties, but it may be more reliable if the consumption module in the household survey is well designed.

3. Consumption may better reflect a household’s actual standard of living and ability to meet basic needs. Consumption expenditures reflect not only the goods and services that a household can command based on its current income, but also whether that household can access credit markets or household savings at times when current income is low or even negative, perhaps because of seasonal variation, harvest failure, or other circumstances that cause income to fluctuate widely.

Figure 1: Summary conceptual frame work



EXPENDITURE DETERMINANTS

Examples are education levels, title to land, transportation, distances to health care and social facilities, and ownership of factors of production like tractors, hammer mills and so on. Poverty and poverty changes are affected by both microeconomic and macroeconomic variables. Within a microeconomic context, the simplest method of analyzing the correlates of poverty is to use regression analysis to see the effect on poverty of a specific household or individual characteristic while holding constant all other characteristics.

The determinants of HH Expenditure are the correlates of poverty (variables with strong influence) but do not explain causality. These are (1) Regional, (2) Community, and (3) Household/ individual characteristics (demographic, economic and social).

- **Regional characteristics** of the location may be influential to expenditure. Factors such as predominant weather conditions and soils, governance, a sound environmental policy, economic, political and market stability may foster higher productivity for farmers.
- **Community characteristics** include the availability of infrastructure (roads, water, and electricity) and services (health, education), proximity to markets, and social relationships. These improve efficiency of living, mobility and productivity, and expand expenditure.
- **HH characteristics** include occupation, household size, age structure, dependency ration, employment status, hours worked, property owned. These are linked to the amount of income needed to service the HH, and quantity of out put produced per period.

CHAPTER 2.0

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews past journals and research work that was relevant to the study. It is presented as follows; the progress on poverty reduction in Zambia, followed by similar past research, and lastly reviews of expenditure determinants.

2.2 DEFINITION

This research addresses what is typically referred to as poverty, that is, whether households or individuals do not possess enough resources or abilities to meet their current needs. This definition is based on a comparison of individuals' income, consumption, education, or other attributes with some defined threshold below which individuals are considered as being poor in that particular attribute.

2.3 PROGRESS ON POVERTY REDUCTION IN ZAMBIA

According to the civil society and poverty reduction strategy process in Zambia (2001), to achieve poverty reduction targets set for 2015, a GDP growth rate of between 6 to 8 percent is required on an annual basis over the intervening period but the projected growth rates of 5 percent, 5.1 percent and 5.5 percent for 2001, 2002 and 2003 respectively may be too modest; for the following reasons:

- 1) Institutional and structural reforms like better pay, improved accountability and better financial management in the public sector need to be accomplished. Related to this is the needed expense to revamp local government so that it can deliver. Also the government budget cannot overnight be oriented towards supporting growth and poverty reduction before an orderly disengagement out of existing commitments occurs. This challenge is a long-term issue.

- 2) These reforms carry a significant financial cost and a heavy administrative burden in the short term, and their full benefits are likely to be felt only after two to three years of implementation
- 3) Many of the proposed interventions in the key growth sectors, such as tourism, mining, industry and agriculture related to infrastructure development require time before they fully contribute to increased growth.

As of December 2008, rural poverty was reported to be standing at 80%, an increase from the reported 75% in the previous year.

2.4 MODELING POVERTY: METHODS

2.4.1 USING RURAL HH INCOME SURVEY DATA FOR POVERTY ANALYSIS: LOG-LINEAR MODEL

Walker, et al (2006) carried out an analysis of poverty in Mozambique, using rural household data. They demonstrated that income survey data can be very informative in explaining the variation across households in the incidence and severity of absolute poverty using a rural household income data. Independent variables reflect demographic factors (gender, household size and composition, education), household assets (land, cashew and coconut trees, livestock, and equipment), access to information, technology and organizations, community attributes and infrastructure, exposure to risks and agro-ecology. For several continuous variables (e.g., land ownership, household size, education) they employed frequency thresholds rather than assuming a particular functional form. This stepwise classification of the independent variables is equivalent to a more flexible piecewise functional form and facilitates the construction and interpretation of the scenarios. Results from regression analysis are used to simulate the impact of alternative interventions on rural poverty. These simulations show the importance of agricultural development variables in poverty reduction scenarios that are usually dominated by educational and demographic considerations when consumption poverty is the focus of analysis.

It is important to notice the underlined success of Walker's research in showing that simulation models have identified the neglected aspect of the importance of agriculture in poverty reduction. Such simulation should be adopted in Zambian research. From past research done, the use of income as a proxy for poverty analysis has problems of accuracy when analyzing rural areas, and especially in Sub-Saharan Africa. However, the analysts used the Log-Linear model for regression, which has been also adopted in this research.

Alwang, et al (1994) in their research to inform WB on status of poverty in Zambia ran a multi-regression model of log-linear form. The analysts used limited data from a small sample survey, and included in their model the following variables: age, sex, and education of hh head, assets of the hh, hh characteristics such as dependency ratio, adult equivalence, geographical region of the hh, distances from necessary facilities, and lastly economic activity variables necessary.

2.4.2 DETERMINANTS OF POVERTY: BINOMIAL AND POLYCHOTOMOUS LOGIT MODELS

Geda, et al (2005) agrees that Strategies aimed at poverty reduction need to identify factors that are strongly associated with poverty and that are amenable to modification by policy. Their research used household level data collected in 1994 in Kenya to examine probable determinants of poverty status, employing both binomial and polychotomous logit models. The study showed that poverty status was strongly associated with the level of education, household size and engagement in agricultural activity, both in rural and urban areas. He continues that in general, those factors that are closely associated with overall poverty according to the Binomial model are also important in the Ordered-Logit model, but they appear to be even more important in tackling extreme poverty. (Determinants of poverty in Kenya, 2005)

Oyugi, (2000) estimates a probit model using data of the 1994 Welfare Monitoring Survey data. The explanatory variables (household characteristics) included: holding

area, livestock unit, the proportion of household members able to read and write, household size, sector of economic activity (agriculture, manufacturing/industrial sector or wholesale/retail trade), source of water for household use, and off-farm employment. The results of the probit analysis show that almost all variables used are important determinants of poverty in rural areas and at the national level, but that there are important exceptions for urban areas (Oyugi, 2000). These results are consistent with those obtained from the meso-level regression analysis. The latter study used household calorie consumption as the dependent variable and the limited number of household characteristics as explanatory variables.

Geda and Oyugi's research can be identified with this one in that both are targeted at identifying factors that are strongly associated with poverty. The models used attempt to explain whether a household is poor or not, and were used because of the nature of data used and the size of population covered the many other variables and poverty groups categorized in their models. In Logit or Probit regression the dependent variable is binary, usually taking on a value of 1 if the family is poor and zero otherwise. These models prove more complicated, thus this research will use the Log-linear model which is just suitable for the research.

Analytical work on determinants of poverty in Zambia is at best scanty. Most of the available studies are descriptive and focus mainly on measurement issues. Earlier poverty studies have focused on a discussion of inequality and welfare based on limited household level data (such as Alwang, et al 1994 funded by the WB and many studies by CSO). This research will add new information on factors associated to rural poverty in Zambia.

2.5 EXPENDITURE DETERMINANTS

2.5.1 COMMUNITY LEVEL CHARACTERISTICS AND RELATION TO POVERTY

According to the Poverty Manual, Haughton's Revision of August 8, 2005, at community level, infrastructure is a major determinant of poverty. Indicators of infrastructure development that have often been used in econometric exercises include proximity to paved roads, whether or not the community has electricity, proximity to large markets, availability of schools and medical clinics in the area, and distance to local administrative centers. Other indicators of community level characteristics include average human resource development, access to employment, social mobility and representation, and land distribution.

Recent research has also stressed the importance of social networks and institutions, and "social capital" (which includes, for instance, the level of mutual trust in the community). In addition to removing social barriers, effective efforts to reduce poverty require complementary initiatives to build up and extend the social institutions of the poor. Social institutions refer to the kinship systems, local organizations, and networks of the poor and can be thought of as different dimensions of social capital. Research on the roles of different types of social networks in poor communities confirms their importance. An analysis of poor villages in North India, for example, shows that social groups play an important role in protecting the basic needs of poor people and in mediating risk. Studies of agricultural traders in Madagascar show that social relationships are more important to traders than input prices. (Haughton, et al, 2005).

How does social capital affect development? The narrowest view holds social capital to be the social skills of an individual – one's propensity for cooperative behavior, conflict resolution, tolerance and the like. A more expansive meso view associates social capital with families and local community associations and the underlying norms (trust, reciprocity) that facilitate coordination and cooperation for mutual benefit. A macro view of social capital focuses on the social and political environment that shapes social

structures and enables norms to develop. This environment includes formalized institutional relationships and structures, such as government, the political regime, the rule of law, the court system, and civil and political liberties. Institutions have an important effect on the rate and pattern of economic development.

From this literature, one may observe that social capital is clearly a complicated characteristic thus often researchers find it difficult to identify appropriate variables that measure social capital quantitatively.

2.5.2 REGIONAL LEVEL CHARACTERISTICS AND THEIR RELATION TO POVERTY.

According to the Poverty Manual, 2005, at the regional level, there are numerous characteristics that might be associated with poverty. The relationship of these characteristics with poverty is country-specific. In general, however, poverty is high in areas characterized by geographical isolation, a low resource base, low rainfall, and other inhospitable climatic conditions. For example, many argue that economic development in Bangladesh is severely retarded due to its susceptibility to annual floods; and Nghe a province in north-central Vietnam is poor in part because it is regularly hit by typhoons, which destroy a significant part of the accumulated stock of capital. In many parts of the world the remoteness of rural areas – which lower the price farmers get for their goods and raise the price they pay for purchases, due to high transport costs – is responsible for generating food insecurity among the poor.

Other important regional and national characteristics that affect poverty include good governance, a sound environmental policy, economic, political and market stability, mass participation, global and regional security, intellectual expression and a fair, functional, and effective judiciary. Regional-level market reforms can boost growth and help poor people, but it is important to note that they can also be a source of dislocation (Haughton, et al, 2005).

2.5.3 HOUSEHOLD CHARACTERISTICS AND THEIR RELATION TO POVERTY.

According to the Poverty Manual, Haughton's Revision of August 8, 2005, indicators of household size and structure are important in that they show a possible correlation between the level of poverty and household composition. Household composition, in terms of the size of the household and characteristics of its members (such as age), is often quite different for poor and non-poor households. The Cambodian CSES of 1993/94 shows that the poor tend to live in larger households, with an average family size of 6.6 persons in the poorest quantile compared to 4.9 in the richest quantile; similar patterns are found in most countries. The poor also tend to live in younger households – with the bottom quantile having twice as many children under 15 per family as the top quantile – and slightly fewer elderly people over age 60. Better-off households also tend to have heads that are somewhat older.

The dependency ratio is calculated as the ratio of the number of family members not in the labor force (whether young or old) to those in the labor force in the household. This ratio allows one to measure the burden weighing on members of the labor force within the household. One might expect that a high dependency ratio will be associated with greater poverty (Haughton, et al, 2005).

It is widely believed that the gender of the household head significantly influences household poverty, and more specifically that households headed by women are poorer than those headed by men. This is of particular importance to Cambodia. Due to male casualties in past wars, women are often the heads of households. Women play an important role in the labor force; both in the financial management of the household and in the labor market, but appear to face large degree of discrimination. They are severely affected by both monetary and non-monetary poverty; for example, they have low levels of literacy, are paid lower wages, and have less access to land or equal employment. According to a report based on a joint conference between the Cambodian Institute for Cooperation and Peace and the World Bank Institute, 43 percent of women are illiterate and 90 percent of these women are poor. So many observers are surprised to learn that

poverty rates are not higher among female-headed than male-headed (Haughton, et al 2005).

Apart from income or consumption which is typically used to define whether a household is poor, there are a number of other economic characteristics that correlate with poverty, most notably household employment and the property and other assets owned by the household. There are several indicators for determining household employment. Within this array of indicators, economists focus on whether individuals are employed; how many hours they work; whether they hold multiple jobs; and how often they change employment (Haughton, et al, 2005).

Household property includes its tangible goods (land, cultivated areas, livestock, agricultural equipment, machinery, buildings, household appliances and other durable goods) and its financial assets (liquid assets, savings and other financial assets). These are of interest as they represent the household's inventory of wealth and affect its income flow, and evidently determine the level of poverty. Furthermore, certain households, especially in rural areas, can be poor in terms of income, but wealthy when their property is taken into consideration. Despite its importance, property is difficult to value in practice in any reliable way. First, one encounters the same problem of under-declaration. Second, it is very difficult to measure certain elements of property such as livestock. Finally, the depreciation of assets may be difficult to determine for at least two reasons: 1) the life span of any given asset is variable; 2) the acquisition of these assets occurs at different moments in each household. Therefore, property is more difficult to use than certain other elements in the characterization of poverty (Haughton, et al, 2005).

CHAPTER 3.0

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the methods used in the study. It highlights the study area, target population, data collection and data analysis.

3.2 STUDY AREA

The entire country was covered by the LCMS conducted by CSO in 2004. The sampling frame used was developed from the 2000 Census of Population and Housing. The country is administratively demarcated into 9 provinces, which are further divided into 72 districts. The districts are further subdivided into 150 constituencies, which are in turn divided into wards. For the purposes of conducting CSO surveys, Wards are further divided into Census Supervisory Areas (CSA), which are further subdivided into Standard Enumeration Areas (SEAs). For the purposes of this survey, SEAs constituted the Primary Sampling Units (PSUs). This covered all 9 provinces of Zambia, and all districts. The data set included both rural and urban classification.

3.3 TARGET POPULATION

This research was restricted to determining factors associated to rural poverty. Therefore only the rural households data in the survey data set were used for the study and where used to run the multiple regression model.

3.4 DATA COLLECTION

Secondary data was used in this research. All other necessary data was obtained from CSO. Particularly, the LCMS 2004 dataset was cardinal to this research. The LCMS data collection was done by way of personal interviews using a structured questionnaire. The

questionnaire was designed to collect information on the various aspects of the living conditions of the households.

The LCMS employed a two-stage stratified cluster sample design whereby during the first stage, 1000 SEAs were selected with Probability Proportional to Estimated Size (PPES). The size measure was taken from the frame developed from the 2000 census of population and housing. During the second stage, households were systematically selected from an enumeration area listing. The survey was designed to provide reliable estimates at district, provincial, rural/urban and national levels.

3.5 DATA ANALYSIS

The dataset was cleaned, organized and analyzed using a computer statistical package of social sciences (SPSS). Descriptive statistics for the rural population were generated using SPSS. The regression analysis was done using another tool called STATA. This facilitated the running of a multiple regression analysis of the determinants of household expenditure per adult equivalent, in order to control for the separate influence of the different factors that unfolded after the study.

The model is:

$$\ln \text{EXP} = f(\text{AGEH}, \text{SEXH}, \text{HHSIZE}, \text{DEPRATIO}, \text{ADEQ}, \text{HEDU}, \text{ECONACT}, \text{EMPMNT}, \text{DFMA}, \text{DTRAN}, \text{DTRAN}, \text{DUBS}, \text{DHOSP}, \text{WPLOU}, \text{WHRMIL}, \text{WTRAC}, \text{WINFO}, \text{WOXEN PROVINCE})$$

Where;

1. Age of HH Head [AGEH]
2. Sex of HH Head [SEXH]
3. Household size [HHSIZE]
4. Dependency ratio [DEPRATIO]
5. Number of adult equivalent [ADEQ]
6. Highest level of education attained by HH Head [HEDU]

7. Principle economic activity of household [ECONACT] (dummy variable)
8. Off-farm employment by any HH members [EMPMNT] (dummy variable)
9. Title to land [OWNL] (dummy variable)
10. Distances;

(Km) nearest Food Market– DFMA

Input market –DIMPMA

Transportation – DTRAN

Upper basic school – DUBS

Hospital/Health care- DHOSP

11. Ownership;

*By household. (dummy variables)

Hammer mill- [WHRMIL]

Tractor- [WTRAC]

Radio/TV [WINFO]

Plough [WPLOU]

Oxen [WOXEN]

12. Province is given as a dummy variable.

The Log-linear model is of general form $\ln(Y) = XB$;

where X are the expenditure determinant variables, β are the parameters, and Y is EXP. OSL estimates obtained will be best linear unbiased estimators of α and β . The slope of the coefficient β measures elasticity of Y with respect to X. so, the β 's will measure elasticity of EXP to each dependant variable (EXP determinants). The model assumes that the elasticity coefficients remain constant throughout.

The fit of the equation is typically measured using R^2 ("adjusted R squared"), which will vary between 0 (no fit) and 1 (perfect fit). There is no hard and fast rule for determining whether an equation fits well, although with household survey data one is often pleased to get an R^2 of 0.5 or more. But it tends to grow smaller if the sample size is very large. In this model, the Link test and Ov-test was used.

We also need to know how much confidence to place in the accuracy of the coefficients as guides to the truth; this is commonly done by reporting t-statistics, which are obtained by dividing a coefficient by its standard error. The rule of thumb is that if the t-statistic is, in absolute terms, smaller than 2, then the coefficient is not statistically significantly different from zero (at about the 95% confidence level); in other words, we cannot be sure that we have picked up an effect, and it is possible that the coefficient just reflects noise in the data.

CHAPTER 4.0

STUDY FINDINGS AND DISCUSSIONS

4.1 INTRODUCTION

This chapter presents findings of the study. It begins with the presentation of demographic, social and economic characteristics of the sample population upon which the findings are based. It then discusses the results. A log-linear model was run and analyzed.

4.2 DEMOGRAPHIC CHARACTERISTICS

4.2.1 POPULATION SAMPLE

According to Table 1, a total of 103, 063 people from all nine provinces of Zambia were sample in the 2004 living conditions survey by CSO. The population constitutes 49.6% males and 50.2% females. These are collapsed into a total of 10358 and 8941 households for rural and urban classification respectively, which translates into 46.3% urban and 53.6% rural households.

Table 1: Sample distribution of the LCMS 2004 dataset

Characteristic	Frequency	Percent
Male	51212	49.6
Female	51851	50.2
Total	103063	99.8
Urban households	8941	46.3
Rural households	10358	53.6

Source: CSO survey data, LCMS (2004)

4.2.2 HOUSEHOLD STATUS (RURAL HOUSEHOLD HEADS)

According to Table 2, the rural population consisted of 77.4% males and 22.6% females. It is very evident that there are far more male headed households than female headed households in the rural areas of Zambia.

Table 2: Sex of household head

Sex	Frequency	Percent
Male	8022	77.4
Female	2336	22.6
Total	10358	100.0

Source: CSO survey data; LCMS (2004)

4.2.3 RURAL HOUSEHOLD HEAD AGE

Table 3 shows that the highest education level attained by heads households was 18 years of school, with the lowest being no years of learning. The oldest head in the sample was 98 years whilst the youngest was 14 years old, giving an average of 43.7 years for a house head. Household size varied between 34 persons which was the largest, and only a single person for the smallest household, giving an average of 5 persons per household.

Table 3: Percentage of household heads per given age range

Age group	Frequency	Percent
10-20	77	0.7
20-30	2054	19.8
30-40	2997	28.9
40-50	2216	21.4
above 50	2995	28.9
Total	10358	100

Source: CSO survey data; LCMS (2004)

4.2.4 LEVEL OF EDUCATION OF RURAL HOUSEHOLD HEADS

According to Table 4 below, 27.2% of the house hold heads have had less than 3 years of learning in school, with 17.7% of the heads having above 9 years of school learning. Approximately 50% of the rural household heads have less than or at least attained 7 years of school (primary school education).

Table 4: Years spent in school by the household head

Years of education	Frequency	Percent
0-3	2814	27.2
3-6	2075	20.0
6-9	3630	35.0
above 9	1837	17.7
Total	10358	100.0

Source: CSO survey data; LCMS (2004)

4.2.5 HOUSEHOLD SIZE

As is shown in Table 5, the smallest household is composed of a single person living alone, whilst the largest household has 34 members. The rural population has an average of 5 members per household.

Table 5: Size of household

	N	Minimum	Maximum	Mean
Household size	10358	1.00	34.00	5.2866

Source: CSO survey data; LCMS (2004)

4.3 SOCIAL AND ECONOMIC CHARACTERISTICS (RURAL HOUSEHOLDS)

4.3.1 MAIN ECONOMIC ACTIVITY

According to Table 6, a total of 58.9% of rural population have farming as main economic activity. The remaining 37.4% depend on various other activities for sustenance such as carpentry, charcoal burning and trading.

Table 6: Principle economic activity

Characteristic	Frequency	Percent
Non farmers	3869	37.4
Farmers	6105	58.9
Total	10358	100.0

Source: CSO survey data; LCMS (2004)

4.3.2 OFF-FARM EMPLOYMENT PER HOUSEHOLD

The Table below shows that 29.2% of the households have at least one member of the household who has off-farm employment as an extra income source. It also shows that 70.8% of the rural population has no one member of the household having an of-farm job.

Table 7: Presence of off-farm employment per household

Off-farm employment	Frequency	Percent
No	7333	70.8
Yes	3025	29.2
Total households	10358	100.0

Source: CSO survey data; LCMS (2004)

4.3.3 TOTAL MONTHLY EXPENDITURE

This expenditure is a summation of all food and non-food expenditures in the household. Non-food expenditures will include payments for education, facilities such as transport and purchase of inputs.

According to Table 8 and 9 below, the lowest expenditure in a household was K2000, with the highest monthly expenditure being that of K9, 207, 649. About 78.9% of the population has expenditure of below 800,000 per month, with 31% falling below K200, 000. Only 9.3% of the rural populations have an expenditure of above K1000, 000 per month.

Table 8: Household monthly expenditure range (ZMK)

	Minimum	Maximum	Mean
Total monthly expenditure	2000.00	9,207,649.7	460,623.4

Source: CSO survey data; LCMS (2004)

The following table shows variation in the household total monthly expenditures in Kwacha:

Table 9: Variation in expenditure range

Expenditure	Frequency	Percent
0-200,000	3287	31.7
200,000-400,000	3340	32.2
400,000-600,000	1555	15.0
600,000-800,000	770	7.4
800,000-1000,000	442	4.3
above 1000,000	964	9.3
Total	10358	100.0

Source: CSO survey data; LCMS (2004). Exchange rate: K5600 per US\$.

4.3.4 OWNERSHIP OF ASSETS BY HOUSEHOLD

According to Table 10, the lowest owned asset is the tractor with 99.1% not owning and only 0.9% of households owning a tractor. Land is the highest owned asset with 89.1% of the rural households living on owner-occupied houses or land. This was followed by radio, plough, oxen and hammer mill with 43%, 15%, 10.2% and 1.7% of households respectively.

It was observed from the analysis that households owning land had higher dependency ratios than those who did not. Further more, land owning households are generally characterized with bigger size of households. It should be noted that title to land included those owning farm land and those just owning a plot with a house of residence.

Table 10: Household assets

Characteristic	Oxen	Plough	Land	H/mill	Tractor	Radio
Non-owning	1053	8725	1127	10174	10258	5874
Owning	9300	1627	9226	179	95	4480
Total	10358	10358	10358	10358	10358	10358
% Owning	10.2%	15.7%	89.1%	1.7%	0.9%	43.3%
%Non owning	89.8%	84.2%	10.9%	98.2%	99.1%	56.7%

Source: CSO survey data; LCMS (2004)

4.3.5 RURAL HOUSEHOLD ACCESS TO FACILITIES

Table 11 shows the distribution of rural households in the given ranges of distance away from nearest facility to the household. It shows that hospitals are the nearest facility to households with 87% of households within 20Km's away from nearest health facility. Where as the furthest facility from households are input markets with 31.5% of households in 20km proximity to input markets, and 40% households covering above 40Km to the nearest input market.

Table 11: Percentage of households for each given range of distance to facilities

Distance (Km)	Food market	Basic school	Transport	Input	Hospital
0-20	66.80%	72.70%	68%	31.5%	87%
20-40	16.70%	13.60%	16.10%	28.1%	4.30%
40-60	6.90%	10.40%	14.40%	14.2%	3.50%
above 60	9.60%	4.30%	1.30%	24.8%	1.50%

Source: CSO survey data; LCMS (2004)

4.4 MODEL ESTIMATION RESULTS

The full model was subjected to a battery of misspecification test. Among them, Link test tested for specification of the model, while the Ramsey Reset test checked for fitness of the model. The model thus satisfied all underlying statistical assumptions. The results of the estimation are shown in table 13 below.

Table 13: Model estimation results

lnEXP	Coefficient	Robust Std. Err.	t	P> t 	[95% Conf. Interval]	
Ageh	0.001327	0.001214	1.09	0.275	-0.00105	0.003707
Sexh	-0.01305	0.04156	-0.31	0.753	-0.09454	0.068431
Depratio	-0.01428	0.015117	-0.94	0.345	-0.04392	0.015361
Hhsize	0.00479	0.006629	0.72	0.470	-0.00821	0.017787
Adeq	-0.15879	0.237894	-0.67	0.505	-0.62522	0.307633
Hedu	0.025149	0.004164	6.04	0.000	0.016986	0.033313
Empmnt	0.010052	0.038211	0.26	0.793	-0.06487	0.084969
Econact	0.025688	0.035366	0.73	0.468	-0.04365	0.095028
Dfma	-0.00079	0.000983	-0.81	0.419	-0.00272	0.001134
Dubs	-0.00536	0.002299	-2.33	0.020	-0.00987	-0.00085
Dhosp	0.00451	0.002088	2.16	0.031	0.000417	0.008603
Dtran	0.000203	0.001529	0.13	0.894	-0.00279	0.0032
Dinpma	-0.00221	0.000704	-3.13	0.002	-0.00359	-0.00082
Wplow	-0.02473	0.060919	-0.41	0.685	-0.14417	0.094713
Woxen	0.045378	0.070262	0.65	0.518	-0.09238	0.183136
Wtrac	-0.1416	0.159989	-0.89	0.376	-0.45528	0.172079
Winfo	0.001709	0.033146	0.05	0.959	-0.06328	0.066697
Whrmil	-0.05335	0.126502	-0.42	0.673	-0.30138	0.194676
Ownl	-0.14979	0.049453	-3.03	0.002	-0.24675	-0.05283
Central	0.237494	0.093936	2.53	0.012	0.053319	0.421668
Copper belt	0.547569	0.098723	5.55	0.000	0.354009	0.741128
Eastern	0.244217	0.08719	2.8	0.005	0.073268	0.415166
Luapula	0.320374	0.080406	3.98	0.000	0.162727	0.478022
Lusaka	0.366517	0.088478	4.14	0.000	0.193044	0.539989
Northern	0.31317	0.084353	3.71	0.000	0.147784	0.478556
Northwestern	0.056739	0.099989	0.57	0.570	-0.1393	0.252782
Southern	0.470289	0.089473	5.26	0.000	0.294863	0.645714
_constant	12.49785	0.262253	47.66	0.000	11.98366	13.01203

F (26, 3799) = 6.37

Prob >F = 0.00

R-squared = 0.046

Root MSE = 0.93389

Source: CSO survey data, LCMS (2004).

It was found that the human capital variables Age of head, Sex of head are not significant determinants of expenditures, with ($p=0.275$ & $p=0.753$ respectively). Household characteristics of Dependency ratio, Adult equivalence and household size are also not significant determinants of expenditures, with ($p=0.345$, $p=0.505$ & $p=0.47$ respectively).

Distance from Input markets, schools, and healthcare facilities tested significantly, with ($p=0.002$, $p=0.02$ & $p=0.031$ respectively). Increased distances from input markets and schools have a negative impact on expenditures and thus a positive impact on livelihood of household being poor. The coefficients can be interpreted to mean a 1 percent increase in distance from input market and schools leads to a 0.22 and 0.53 percent decrease in expenditures in rural Zambia. On the other hand, increased distance from hospitals had positive impact on expenditures, and thus a negative impact on livelihood of household being poor. Thus, for a 1 percent increase in distance from a hospital, there is a 0.45 percent increase in expenditure. Distance from the rest of the facilities namely Food markets and Transport access point proved not significant determinants of expenditures, with ($p=0.419$ & $p=0.894$ respectively). Distance from facilities is clearly associated with increased poverty; controlling for other influences, distance has the same impact across all provinces.

The variable HEDU tested significantly with $p=0.000$. Education of the household head has strong influence on household expenditures, even controlling for many of the other factors associated with income generation. The coefficient indicates that a 1 year increase in education of the head will increase household expenditure by 2.5 percent. Returns to education in rural Zambia are substantial.

The presence of assets a plough, oxen, tractor, radio or hummer/grinding mill in a household proved not significant determinants for expenditure, with ($p=0.685$, $p=0.578$, $p=0.959$ & $p=0.673$ respectively). Only Ownership of land or title to land tested significantly, with $p=0.002$. The coefficient indicates that more land ownership reduces expenditure, which is for every hectare increase in land ownership there is 15 percent reduction in household expenditure. According to Jeffrey, et al (1994), households with title to land are less likely to be poor than those lacking title but despite this, one cannot

infer that land titling would be an effective means of reducing poverty because ownership of land is more a sign of wealth than a means of raising agricultural productivity. He continues to argue that there is a much smaller difference between poverty rates by titling status for agriculture compared to non-agricultural households. Thus, he concludes by attesting that people own land because they are wealthy, they are not wealthy because they own land. He found the link between title and poverty from a research done in 1994 not conclusive enough to warrant recommendation of an ambitious land titling programme (as is sometimes advocated, World Bank, 1992). A unique survey design is required.

The findings on title to land prove consistent with the bivariate analysis above, showing that land ownership is associated, with wealth and not per say poverty, which is estimated here using expenditure as a proxy to poverty. Land in the rural areas is usually acquired through customary tenure rather via the state; therefore this can partly explain for the result.

Variation in locality of households according to Province is a significant determinant of expenditure. Province, which was presented in the model by a dummy variable, showed that Central, Copper Belt, Eastern, Luapula, Lusaka, Northern, and Southern provinces are significant, with ($p=0.02$, $p=0.000$, $p=0.005$, $p=0.000$, $p=0.000$, $p=0.000$, & $p=0.000$). The coefficients are explained with respect to the reference being Western province. The coefficients indicates that, rural households in Eastern, Central, Copperbelt, Luapula, Lusaka, Northern and Southern have expenditures that are 24, 23.7, 54.7, 32, 36.6, 31.3, and 47 percent higher than rural households in Western province of Zambia. This can be attested to differences in institutional structure and organization according to the province. These are things such as cooperatives linkage and support from Government. It can also be attributed to differences in cultures, soil fertility, prices of inputs, wages, and producer prices, though pinpointing the exact factors will require another survey design.

CHAPTER 5.0

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

This chapter outlines the conclusions and recommendations about the research findings. The generalizations can be used to help devise poverty alleviation programmes and point to subjects needing additional research. Recommendations presented could advise Government and stakeholders in policy formulation and direction of efforts towards poverty reduction suitable to the *Zambian* situation.

5.2 CONCLUSIONS

The information from the analysis of the LCMS survey data, combined with other studies of *Zambian* poverty and other countries, allow us to make some generalizations about location, social, and economic factors associated with poverty in rural *Zambia*.

Firstly, although rural *Zambia* is overwhelmingly poor the largest prevalence of poor people are found in the most isolated areas. The descriptive analysis showed, and regression results confirmed, that distance from key facilities such as input market, hospital, and schools are positively associated with poverty.

Secondly, education is strongly associated with reductions in poverty. Households with heads with some education are better off than those with none. More education reduces poverty even more. At the same time, children of poor families are less likely to attend school (as most children get withdrawn from school during stress times) and are more likely to be employed by their family in an agricultural job without pay. For poor households, short-run considerations such as the need to withdraw children during periods of farm labour shortages may outweigh long-run benefits from education.

Thirdly, agriculture is the main industry in rural areas. Outside agriculture, there is a wide variety of occupations in rural areas. This variety makes it difficult to categorize these

occupations, or target them for possible interventions. Agriculture, because it is present every where in rural areas, because it is the main source of income and sustenance among the poor, and because it can provide an overwhelmingly positive contribution to national development must be the centerpiece of any rural development and poverty alleviation strategy.

Lastly, differences in regional characteristics within the country have shown to have strong relationship with poverty. The presence or absence of certain factors can affect expenditure either positively or negatively, though some such as poor soils may not be altered by intervention.

5.3 RECOMMENDATIONS

Firstly, there a critical need for the government and other stake holders to come up with programmes that cover problems associated with isolation, especially that the government of Zambia policy of pan territorial pricing is not completely enjoyed in the rural areas where Depots may be non-existent.

There is need to sensitize households on the importance of supporting school children during stress times, for example during hunger periods. This hopefully will increase the number of educated persons in time to come, and eventually lead to educated household heads in future.

Programmes designed to provide off-farm income generation activities or services should be linked closely to agriculture.

Further research should be done to investigate the regional factors that explain differences in expenditure patterns depending on the province of a rural household. These factors, when identified, can be can be a source of intervention in order to avail the same factors where lacking.

REFERENCES

Aline C., Hentschel J., and Wodon Q., (2001). **Poverty Measurement and Analysis**. World Bank institute publications. (http://poverty2.forumone.com/files/5467_chap1.pdf - Accessed on 1st November, 2008).

Alwang J. and Siegel B., (1994). **Rural Poverty in Zambia: An Analysis and Policy Recommendations**. Word Bank working paper.

Civil Society for Poverty Reduction in Zambia, (2008). **Post Budget Brief 2008**. (www.cspr.org.zm/PRESSRELEASE/2008_POST_BUDGET_PRESS.pdf - Accessed on 26th October 2008).

Central Statistics Office, (2008). **Consumer Price Index November 2008 release**. Prices and consumption studies branch Lusaka, Zambia.

Geda A., Jong N., Kimenyi M., and Mwabu G., (2005). **Determinants of Poverty in Kenya: A Household Level Analysis**. University of Connecticut, Department of Economics working paper series. (http://digitalcommons.uconn.edu/econ_wpaers/200544 -Accessed on 17th Dec, 2008).

Haughton J. and Khandker S., (2005). **Poverty Manual: Introduction to Poverty**. World Bank institute publications. (www.siteresources.worldbank.org/PGLP/Resources/PMch1.pdf -Accessed on 7th September 2008).

Kozel V., (2006). **The Unique Face of Poverty in Zambia**. Power point Presentation to the World Bank. (<http://sitesources.worldbank.org/INTUNIFESSD/Resourses/TFESSDZambia.pdf> - Accessed on 4th November 2008).

Muyanga M., Ayiekox M., Oyugi L. and Bundiy M., (2006). **Determinants of Transient and Chronic Poverty: Evidence from Kenya**. PEP Working paper.

(<http://132.203.59.36/New-PEP/HTML/meetings/Addis/papers/Milu.%20Muyanga.pdf> - Accessed in Dec, 2008)

Ministry of Agriculture and Cooperatives, (2008). **Zambian Food Security Monitor 2008**. Agriculture consultative forum.

(www.acf.org/pdf/The%20Zambia%20FS%20Monitor%20Issue%20201-2008.pdf - Accessed 27th November 2008).

CSPR, (2003). **The Civil society and the poverty reduction strategy process in Zambia Brief 2003**. (<http://www.jctr.org.zm/cspr/PRSP-paper.htm> - Accessed on 4th November 2008, 16:50hrs).

Walker T., Boughton D., Tschirley D., Pitoro R. and Tomo A., (2006). **Using Rural Household Income Survey Data to Inform Poverty Analysis: an Example from Mozambique**. Ministry of Agriculture Working Paper. (<http://ageconsearch.umn.edu/bitstream/255676//1/CP061087.pdf> -Accessed on 29th October 2008).

Central Statistic Office, (2006). **Zambian Living Conditions Monitoring Survey 2006 Report**. Central Statistics Office printing press, Lusaka, Zambia.

APPENDICES

Appendix 1: Household variables used in analysis model

The following is a sample of 200 households and the respective variables used to run the regression. These are part of the LCMS 2004 data set. The variables given are;

1. Age of head (ageh)
2. Sex of head (sexh)
3. Dependency ratio (depratio)
4. Level of education (HEDU)
5. Adult equivalent (adeq)
6. Household size (hhsiz)
7. Off-farm employment (OFFEMP)
8. Economic activity (ECONACT)
9. Distance to food market (fmarktdist)
10. Distance to school (schdist)
11. Distance to hospital (hosptdist)
12. Distance to transport (transdist)
13. Distance to input market (inpmadist)
14. Ownership of plough (plough)
15. Ownership of radio (radio)
16. Ownership of hammer mill (hmill)
17. Ownership of land (ownlnd)
18. Ownership of oxen (oxen)
19. Ownership of tractor (tractor)
20. Expenditure (Exp)
21. Log expenditure (lnExp)

pratio	agehh	SEXHH	hhsz	adeq	HEDU	OFFEMPL	ECONACT	fmarkt	schdist	hosptdist	transdist
	0	31 male	1	1	9 no		farmers				
	4	41 male	12	1	9 no		farmers	3			
0.33333		40 male	7	1	7 no		farmers				
0.5		68 female	2	1	0 no		farmers				
0.5		40 male	5	1	7 no		farmers			40	
1.5		36 male	4	1	4 no		farmers			40	
2		38 male	5	1	9 no		farmers			40	
2		38 male	5	1	6 yes		farmers			8	
0.25		50 male	4	1	12 no		farmers			20	
1		45 male	6	1	6 no		farmers			30	
0.2		41 female	5	1	6 no		farmers				
1		30 male	7	1	9 no		farmers			35	
0		47 male	2	1	7 no		none farme				
0		28 male	1	1	11						
0		30 male	2	1	7 no		farmers			60	
0		37 male	4	1	9 no		farmers	40		30	
2		34 male	11	1	2 yes		farmers	1	1	1	0
1		26 male	7	1	7 yes		farmers	1	1	1	0
0.5		33 male	5	1	7 yes		farmers	0	0	0	0
1.33333		40 female	6	1	12 yes		farmers	3	3	3	
1		48 male	9	1	9 no		farmers		2	5	0
1		82 male	1	1	6 no		farmers		0	2	2
6		55 female	11	1	5 no		farmers	2	2	2	
0.16667		39 male	6	1	14 no		farmers	2		2	0
0.6		26 male	7	1	12 yes		farmers		1	1	0
0.28571		58 male	8	1	7 no		farmers		2	3	0
0.25		69 male	9	1	7 no		farmers	18	3	3	0
2		71 female	5	1	0		none farme	3	1	3	3
1.66667		49 male	7	1	7 no		none farme	0		0	0
0.33333		53 male	3	1	7		none farme			0	0
0		37 male	7	1	12 no		farmers		0	4	4
1.33333		29 male	9	1	5 no		farmers	9	1	9	9
1.16667		55 male	12	1	5 no		farmers	7	3	7	7
1.33333		32 male	6	1	7 no		farmers	3	3	11	11
2.5		44 female	6	1	6 no		farmers	3	3	12	12
4		40 female	4	1	3 no		farmers	13	6	13	13
0.75		56 female	6	1	0 no		farmers	14	5	14	
0.5		68 female	2	1	0 no		farmers	3	14	14	14
0.6		40 female	7	1	7 yes		farmers	8	5	8	8
0.33333		34 male	3	1	0 no		farmers	3	4	9	9
0		28 male	5	1	9 no		farmers	7	5	7	7
1.75		45 male	10	1	7 no		farmers	12	4	12	12
1.21429		46 male	30	1	12 no		farmers	8	4	8	8
1.14286		62 male	14	1	4 no		farmers	15	6	15	15
0.5		29 male	2	1	12 no		farmers	4	6	8	8
0		34 male	6	1	9 no		none farme	2	6	7	7

0	51 male	5	1	6 no	farmers	1	1	1	1
0.66667	41 male	4	1	7 no	none farme	1	1	1	0
0.75	40 male	6	1	12 no	farmers	2	2	2	0
0.5	26 male	2	1	7 no	farmers	2	2	2	0
1.5	30 male	4	1	0 no	farmers	2	2	2	2
2.5	70 female	6	1	1 yes	farmers	5	4	5	5
3	58 female	3	1	2 no	farmers	5	6		6
0.33333	22 male	3	1	8 no	farmers	8	6	8	
0.66667	39 male	4	1	9 yes	farmers	7	5	7	28
0.75	76 male	9	1	6 yes	farmers	10	7	10	10
0.33333	68 female	3	1	7	none farme	2	2	2	0
1.2	83 male	10	1	11 no	farmers	8	6	8	8
0	24 male	2	1	12 no	none farme	1	4	10	10
0.33333	30 male	3	1	12 no	none farme	4	10	4	4
0	29 male	5	1	9 no	farmers	0	0	0	0
0	24 male	3	1	2 no	farmers	10	18	18	10
1	59 male	3	1	2 no	farmers	10	18	18	10
1.28571	60 male	15	1	7 no	farmers	10	18	18	10
2.66667	51 male	10	1	4 no	farmers	10	18	18	10
4	83 female	4	1	0 no	farmers	10	18	18	10
0.33333	33 male	3	1	9 no	farmers	10		18	10
2.5	27 male	6	1	4 no	farmers	10	18	18	10
1.38462	60 male	34	1	6 no	farmers			18	10
0.82353	57 male	30	1	2 no	farmers	10	18	18	10
0.57143	40 male	10	1	11 no	farmers	10	18	18	10
0.16667	68 male	6	1	6 no	farmers	0	12	12	
1.55556	48 male	23	1	7 no	farmers	10	18	18	10
0	49 male	3	1	1 no	farmers	18	14	19	18
0.25	30 female	4	1	3 no	farmers	10	18	18	10
3	27 female	3	1	4 no	farmers	10	18	18	10
0	27 male	7	1	9 no	farmers	10	18	18	10
1.33333	32 male	6	1	6 no	farmers	12	0	12	12
0.5	50 female	8	1	7 no	farmers	16	2	16	16
1.5	26 male	4	1	9 no	none farme	3	2	16	16
2.2	38 male	15	1	0 no	farmers	16	3	16	16
3	51 male	7	1	7 no	farmers	16	2	16	16
1	23 male	3	1	8 no	farmers	16	4	16	16
10	32 male	15	1	7 no	farmers	12	0	12	12
1	39 male	13	1	7 no	farmers	16	0	16	16
0.77778	56 male	15	1	7 no	none farme	12	0	12	12
0.28571	51 male	8	1	10 no	farmers	16	2	16	16
1.25	36 male	8	1	7 no	farmers	12	2	12	12
	80 male	1	1	1	none farme	12	2	12	12
0	40 female	1	1	9	none farme	12	4	3	
0	45 male	1	1	12 no	none farme	16	2	16	16
0	43 female	2	1	0 no	farmers	0	1	0	0
	46 male	7	0.78	7	none farme	10	3	3	

2.5	33 male	7	1	7	none farme	10	6	6	
2.5	37 male	6	1	3 no	farmers	43	4	35	0
0.66667	46 male	14	1	5 no	farmers	3	5	20	2
1	36 female	5	1	9 yes	farmers	4	4	30	2
1.2	48 male	10	1	7 no	farmers	40	2	30	0
1.66667	67 male	7	1	7 no	farmers	45	1	18	
2	37 male	8	1	9 yes	farmers	40	2	40	0
0.66667	47 female	4	1	7 no	farmers	40	2	40	0
	71 male	4	1	2 no	farmers	10	1	10	0
2	36 male	11	1	7 no	farmers	43	4	35	0
0.33333	26 male	3	1	7 no	farmers	5	3	3	
	64 female	5	1	3 no	farmers	40	2	38	0
1	48 male	3	1	7	none farme	40	2	40	0
0	30 male	5	1	9 no	farmers	40	1	40	0
0	41 male	4	1	10 no	none farme	4	3	0	
0.4	50 male	6	1	7 no	farmers	4	2	33	4
2	68 male	11	1	6 no	farmers	3	2	30	3
1.16667	71 male	12	1	2	none farme	5	3	25	
1.8	58 male	13	1	10 no	farmers	2	4	25	
0.66667	26 male	4	1	9 no	farmers	2	2	12	2
1	30 male	3	1	8 no	farmers	2	4	2	3
3	51 male	15	1	7 yes	none farme	2	2	25	2
0.6	71 male	15	1	3 no	farmers	2	2	25	25
1.33333	40 male	13	1	9 no	farmers	2	2	25	2
0.75	52 male	13	1	3 no	farmers	2	3	25	2
3	38 female	6	1	0 no	none farme	3	4	30	3
0.14286	43 female	7	1	3 no	none farme	4	5	1	35
0.33333	57 female	3	1	2 no	none farme	3	3	0	3
0	50 female	2	1	0 no	none farme	4	4	25	
	35 male	5	1	7 no	farmers	2		3	1
0.6	57 male	7	1	7 no	farmers	3	2	2	
1.2	60 male	10	1	6 yes	farmers	4		4	4
2	75 male	11	1	12 no	farmers	3		3	
1	51 male	3	1	10 no	farmers	7	1		
0.25	36 male	4	1	7 no	farmers				
1	58 male	8	1	6 yes	farmers				1
1.33333	35 male	6	1	12 no	farmers	3	1	3	4
1.2	59 male	10	1	6 no	farmers	3		3	4
0.16667	42 male	6	1	9 yes	farmers	3		3	2
1	34 male	5	1	9 yes	none farme	2		2	3
1	32 female	6	1	9 no	none farme		1	10	8
2	38 male	8	1	7 no	none farme	3		3	3
0.66667	25 male	4	1	9 no	farmers			4	6
0	27 male	5	1	5 no	farmers				1
4	38 male	6	1	6 yes	farmers	1	4	6	
1.66667	38 male	7	1	7 no	farmers	5	5	5	5
2	66 female	5	1	3 yes	farmers	3	3	3	3

2	33 male	5	1	6 yes	farmers	3	3	3	3
0.2	57 male	5	1	7 no	farmers	4	4	4	4
0	45 male	2	1	4 no	none farmer	10	10	35	
	73 male	6	1	7 no	farmers	6	6	6	6
2.5	71 female	6	1	0 yes	farmers	5	5	5	5
0.75	77 male	6	1	6 no	farmers	3	3	3	0
0.83333	56 male	10	1	9 no	farmers	3	3	3	3
0.8	82 male	8	1	5	none farmer	4	8	15	8
0	15 female	1	1	6 no	none farmer	4	4	4	4
1	40 male	3	1	7 no	none farmer	3	3	3	3
0	57 male	1	1	6 no	none farmer	3	3	3	3
2	45 male	11	1	12 no	farmers	10	10	12	10
1.5	31 female	9	1	7 no	farmers		0		
0.8	39 female	8	1	12 no	farmers		1	3	
0	42 male	2	1	9 no	farmers		0		
0.33333	37 male	3	1	9 no	farmers		3	5	
	76 female	1	1	0 no	farmers	30	1	4	
1	30 male	5	1	12 no	farmers		2	4	
0.5	31 male	2	1	8 no	farmers	0	1	2	
1	35 male	5	1	9 no	farmers		1	2	
0.66667	72 male	7	1	9 yes	farmers		1	5	
0.875	45 male	14	1	10 yes	farmers		1	1	
2	23 female	5	1	6	none farmer		2	2	
1	43 male	4	1	7	none farmer		1	3	
0	24 male	1	1	7	none farmer		0		
2	30 female	2	1	2 no	farmers		2	5	
0	26 male	4	1	7 no	farmers			1	
0.33333	34 male	12	1	7 yes	farmers	9	3	9	9
2	32 male	5	1	7 no	farmers	9	31	9	9
5	73 male	5	1	3 no	farmers	0	3	9	9
1.25	38 male	8	1	4 no	farmers	0	3	9	9
1	36 female	7	1	5 no	farmers	9	4	9	9
1.5	24 male	4	1	9 no	farmers	0	3	9	9
	73 male	4	1	4 no	farmers	1	3	9	9
1	23 male	3	1	7 no	farmers	1	4	9	9
1	34 male	4	1	9 no	farmers	1	3	9	9
1.66667	22 female	7	1	1 no	farmers	1	6	9	9
3	28 female	3	1	0 no	farmers	4	6	9	9
2	26 male	5	1	4 no	farmers	3	6	12	12
1	30 male	3	1	6 yes	farmers	4	7	11	11
0	43 male	2	1	7 yes	farmers	0	3	9	9
0	56 male	5	1	0		3	4	31	13
0	26 male	1	0.95	2	none farmer	2		2	2
	53 male	8	1	7 yes	farmers	50		3	
1	31 male	3	1	7 no	farmers	1		1	8
0.66667	28 male	4	1	10 no	none farmer	3		3	
1	41 male	5	1	9 no	farmers	0		0	

0.8	42 male	8	1	7 no	farmers	0		0	
1	67 male	9	1	7 no	farmers			4	
3	74 female	3	1	5 no	farmers	2		1	
1.75	45 male	10	1	7 no	farmers	1		2	1
5	32 male	8	1	10 no	farmers	4		3	
0.4	67 male	6	1	9 no	farmers	50		4	
0.28571	62 male	8	1	7 no	none farme	60		90	
1.66667	47 female	9	1	1 no	none farme		8		
0	33 male	1	1	14 no	none farme	2		3	
0	30 male	6	1	7	none farme	0		0	
0.66667	65 male	6	1	14 no	farmers	2	2	2	2

inpmarkt	plough	oxen	tract	radio	hmill	ownlnd	Exp	lnExp
	no	no	no	yes	no	yes	187000	12.13886
	no	no	no	no	no	yes	1607000	14.28988
	no	no	no	yes	no	yes	169000	12.03765
	no	no	no	no	no	yes	248000	12.42118
	no	no	no	no	no	yes	290333	12.57878
	no	no	no	no	no	yes	180000	12.10071
	no	no	no	yes	no	yes	275100	12.52489
	no	no	no	yes	no	yes	140067	11.84987
	no	no	no	yes	no	yes	246833	12.41647
	no	no	no	yes	no	yes	384983	12.86096
	no	no	no	no	no	yes	90659.5	11.41487
	yes	yes	no	yes	no	yes	404167	12.90958
	no	no	no	no	no	yes	250000	12.42922
	no	no	no	no	no	yes	231000	12.35017
	no	no	no	yes	no	yes	162000	11.99535
	no	no	no	yes	no	yes	574700	13.2616
1	no	no	no	yes	no	yes	269967	12.50605
	yes	yes	no	yes	no	yes	1401267	14.15289
18	no	no	no	yes	no	yes	649900	13.38457
	yes	yes	no	no	no	yes	360783	12.79603
5	yes	yes	no	yes	no	yes	192200	12.16629
	no	no	no	no	no	yes	142200	11.86499
	yes	yes	no	yes	no	yes	1337000	14.10594
2	yes	yes	no	yes	no	yes	1386800	14.14251
	no	no	no	yes	no	yes	1177400	13.97882
3	yes	yes	yes	no	no	yes	801792	13.5946
18	yes	yes	no	yes	no	yes	458793	13.03635
14	no	no	no	no	no	yes	69366.7	11.14716
	no	no	no	yes	no	yes	266167	12.49188
	yes	no	no	yes	no	yes	176417	12.0806
	no	no	no	yes	no	yes	548917	13.2157
	yes	yes	no	yes	no	yes	731083	13.50228
	yes	yes	no	yes	no	yes	259682	12.46721
	yes	yes	no	yes	no	yes	108083	11.59066
	no	no	no	no	no	yes	152817	11.93699
	no	no	no	no	no	yes	358783	12.79047
	yes	yes	no	yes	no	yes	506525	13.13533
	no	no	no	no	no	yes	27000	10.20359
	no	no	no	yes	no	yes	92816.7	11.43838
	no	no	no	yes	no	yes	417500	12.94204
	yes	yes	no	yes	no	yes	228490	12.33925
	yes	yes	no	yes	no	yes	492033	13.1063
	yes	yes	yes	yes	no	yes	1021974	13.83725
	yes	yes	yes	no	no	yes	694833	13.45143
	yes	yes	no	yes	no	yes	268000	12.49874
	no	no	no	yes	no	yes	257500	12.45877

26	no	no	no	yes	no	yes	257000	12.45683
	no	no	no	yes	no	no	488633	13.09937
	no	no	no	yes	no	no	379883	12.84762
	no	no	no	no	no	yes	271750	12.51264
	no	no	no	yes	no	yes	371500	12.8253
	no	no	no	yes	no	yes	304083	12.62506
	yes	no	no	no	no	yes	180500	12.10349
8	yes	no	no	yes	no	yes	683500	13.43498
	no	no	no	yes	no	yes	671950	13.41794
	yes	yes	no	yes	no	yes	881583	13.68948
	no	no	no	no	no	yes	246000	12.41309
	yes	yes	yes	yes	yes	yes	694417	13.45083
	no	no	no	no	no	no	739083	13.51317
	no	no	no	yes	no	no	344000	12.7484
	no	no	no	yes	no	yes	774281	13.55969
12	yes	yes	yes	yes	no	yes	285500	12.562
12	no	no	no	yes	no	yes	301500	12.61653
12	yes	no	no	yes	no	yes	610101	13.32138
12	yes	yes	no	yes	no	yes	138000	11.83501
12	no	no	no	no	no	yes	273792	12.52012
12	no	no	no	no	no	yes	126400	11.74721
12	yes	yes	no	no	no	yes	358000	12.78829
12	yes	yes	yes	no	no	yes	699750	13.45848
12	yes	yes	yes	yes	no	yes	691083	13.44602
12	yes	yes	no	yes	no	yes	372050	12.82678
12	yes	yes	no	yes	no	yes	617517	13.33346
12	yes	yes	yes	no	no	yes	3467600	15.05897
25	no	no	no	no	no	yes	298910	12.6079
12	no	no	no	no	no	yes	102167	11.53436
12	no	no	no	no	no	yes	73200	11.20095
12	no	no	no	yes	no	yes	416583	12.93984
16	yes	no	no	no	no	yes	319000	12.67295
22	no	no	no	yes	no	yes	397000	12.89169
22	no	no	yes	no	no	no	292000	12.58451
22	yes	yes	no	no	no	yes	164500	12.01067
22	yes	no	no	yes	no	yes	314400	12.65842
22	no	no	no	yes	no	yes	269700	12.50507
22	yes	yes	no	yes	no	yes	701667	13.46121
22	yes	yes	no	yes	no	yes	2345900	14.66818
22	yes	yes	no	no	no	yes	226150	12.32895
22	yes	no	yes	yes	no	yes	398100	12.89446
22	no	no	no	no	no	yes	252000	12.43718
22	no	no	no	no	no	no	25000	10.12663
12	no	no	no	no	no	yes	155500	11.9544
0	no	no	no	yes	no	yes	65900	11.09589
0	no	no	no	no	no	yes	238500	12.38212
	yes	yes	no	yes	no	yes	544917	13.20839

	no	no	no	yes	no	yes	660108	13.40016
43	yes	yes	no	yes	no	yes	114300	11.64658
	yes	yes	no	yes	no	yes	790792	13.58079
	no	yes	no	yes	no	yes	88333.3	11.38887
40	yes	yes	no	no	no	yes	750250	13.52816
	yes	no	no	no	no	yes	282333	12.55084
40	yes	yes	no	yes	no	yes	415000	12.93603
40	no	no	no	yes	no	yes	240917	12.39221
	yes	yes	no	yes	no	yes	232083	12.35485
43	yes	yes	no	no	no	yes	862083	13.66711
	no	no	no	yes	no	yes	196967	12.19079
40	no	no	no	no	no	yes	205750	12.23442
40	no	no	no	no	no	yes	133000	11.7981
40	no	no	no	yes	no	yes	411000	12.92635
30	yes	no	no	no	no	yes	229750	12.34475
2	yes	yes	no	yes	no	yes	610350	13.32179
	yes	yes	no	no	no	yes	419200	12.9461
	yes	yes	yes	yes	no	yes	222417	12.31231
	yes	yes	no	yes	no	no	767983	13.55152
40	no	no	no	yes	no	yes	109800	11.60642
30	no	no	no	no	no	yes	679500	13.42911
25	yes	yes	no	yes	yes	yes	413167	12.93161
25	yes	yes	no	no	no	yes	490651	13.10349
25	yes	yes	no	yes	no	yes	207667	12.24369
25	yes	no	no	no	no	yes	730167	13.50103
	yes	no	no	yes	no	yes	150000	11.91839
35	no	no	no	no	no	yes	698000	13.45597
25	yes	no	no	no	no	yes	195400	12.1828
	no	no	no	no	no	yes	206000	12.23563
3	no	no	no	no	no	yes	347400	12.75823
	no	no	no	no	no	yes	106750	11.57825
	no	no	no	no	no	yes	245333	12.41037
	no	no	no	yes	no	yes	189917	12.15434
	no	no	no	no	no	yes	60400	11.00874
	no	no	no	no	no	yes	311000	12.64755
	yes	yes	no	no	no	yes	271500	12.51172
3	no	no	no	no	no	yes	361708	12.79859
	yes	yes	no	yes	no	yes	320250	12.67686
3	yes	yes	no	yes	no	yes	804000	13.59735
	yes	yes	no	yes	no	yes	378583	12.84419
0	no	no	no	no	no	yes	355250	12.78058
	no	no	no	yes	no	yes	89500	11.40199
	no	no	no	yes	no	yes	221200	12.30682
	yes	no	no	no	no	yes	178000	12.08954
10	yes	no	no	yes	no	yes	246575	12.41542
	no	no	no	yes	yes	yes	324583	12.6903
	no	no	no	yes	no	yes	205100	12.23125

	no	no	no	yes	no	yes	270600	12.5084
	yes	no	no	yes	no	yes	309667	12.64325
	no	no	no	no	no	yes	368000	12.81584
	yes	no	no	yes	no	yes	127333	11.75456
	yes	no	no	no	no	yes	152283	11.9335
	yes	no	no	yes	no	yes	391500	12.87774
	yes	yes	no	yes	no	yes	285500	12.562
8	no	yes	no	yes	no	yes	307833	12.63731
	no	no	no	no	no	yes	541000	13.20117
	no	no	no	no	no	yes	129000	11.76757
	no	no	no	no	no	no	201000	12.21106
	no	no	no	yes	no	no	580149	13.27104
	yes	no	no	yes	no	yes	152317	11.93372
	no	no	no	no	yes	yes	333500	12.7174
	no	no	no	yes	no	yes	168000	12.03172
	no	no	no	yes	no	yes	209000	12.25009
	no	no	no	no	no	yes	352750	12.77351
	no	no	no	yes	no	yes	313400	12.65524
	no	no	no	yes	no	no	319000	12.67295
	no	no	no	yes	no	yes	135500	11.81673
	yes	no	no	yes	no	yes	336833	12.72734
	yes	no	yes	no	yes	yes	1421703	14.16737
	no	no	no	yes	no	yes	180417	12.10302
	no	no	no	no	no	yes	206917	12.24007
	no	no	no	no	no	yes	49000	10.79958
	no	no	no	yes	no	no	326833	12.69721
	no	no	no	no	no	yes	109000	11.5991
36	no	no	no	no	no	yes	203625	12.22404
36	no	no	no	yes	no	yes	187525	12.14167
52	yes	no	no	yes	no	yes	314167	12.65768
36	no	no	no	no	no	yes	575667	13.26328
36	no	no	no	no	no	yes	387833	12.86833
6	yes	no	no	yes	no	yes	382250	12.85383
36	no	no	no	yes	no	yes	66083.3	11.09867
36	no	no	no	yes	no	yes	233400	12.36051
36	no	no	no	no	no	yes	152700	11.93623
36	no	no	no	no	no	yes	184000	12.12269
36	no	no	no	no	no	yes	190283	12.15627
34	no	no	no	yes	no	yes	131825	11.78923
35	no	no	no	no	no	yes	188000	12.1442
36	yes	no	no	yes	no	yes	157000	11.964
	no	no	no	no	no	yes	158500	11.97351
	no	no	no	no	no	yes	90000	11.40757
	no	no	no	yes	no	yes	677667	13.42641
	no	no	no	yes	no	no	458500	13.03572
	yes	no	no	yes	no	yes	139000	11.84223
	no	no	no	yes	no	yes	324000	12.6885

	no	no	no	yes	no	yes	424500	12.95867
	no	no	no	yes	no	yes	185500	12.13081
	no	no	no	no	no	yes	231000	12.35017
	yes	no	no	yes	no	yes	348667	12.76187
	yes	yes	no	no	no	yes	291450	12.58262
	yes	yes	no	yes	no	yes	456000	13.03025
90	yes	yes	yes	yes	no	yes	211600	12.26245
	yes	no	no	no	no	yes	188000	12.1442
	no	no	no	yes	no	yes	621000	13.33909
	no	no	no	yes	no	yes	438300	12.99066
52	no	no	no	yes	no	no	916883	13.72874