



MEKELLE UNIVERSITY
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COLLEGE OF BUSINESS AND ECONOMICS

CONSUMPTION BASE MEASURES AND ANALYSIS OF URBAN POVERTY
THE CASE OF MAICHEW, SOUTHERN TIGRAY

BY

MENASBO GEBRU

A THESIS

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ADVISOR: FREDU NEGA (PhD)

CO-ADVISOR: ALEMAT HAGOS (MSc)

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ABSTRACT

This study explores the extent of poverty and vulnerability to poverty of households of urban residents of Maichew, southern Tigray Regional State. The town is ranked at the bottom in growth momentum among similar zonal towns of the region and the society exists in abject poverty. On the other hand, the area is nominated as a growth corridor of the region. Consumption approach is applied for the poverty analysis. The study thoroughly looks the welfare status at household level through different analytical techniques like Foster, Greer and Thorbecke (FGT), OLS, Probit, Tobit, 3FGLS and Gini coefficient. Using the Cost of Basic Needs approach, food and total poverty lines of the study area are Birr 187 and Birr 251 per month per adult respectively. Poverty profile of the town reveals that 31.70% head count, 8.9% poverty gap and 3.75% poverty gap square. Multinomial regression result indicates that deteriorating in social transition of household head's is dominant. OLS regression results illustrate that female headed households, educational level of the household head and spouse have positive impact on welfare while family size, square age of household head, divorced and widowed headed households have negative effect to welfare. Except in few variables, most of OLS and probit results of welfare are consistent. Tobit model describes factors affecting poverty gap and poverty severity of the poor households. Accordingly, pensioner headship, family size and age square of household head aggravate the probability of falling in to poverty gap and poverty severity. But being petty trade household head, head education, ownership of property and service indices reduce the probability of falling to poverty severity. Using 3FGLS, the mean probability of vulnerable to poverty is 0.4 which ranges from 0.041 to 0.89. Welfare inequality of the entire population demonstrates that the bottom poor quintile shares only 6.37% of the total mean consumption expenditure while the top quintile takes 49.39%. Furthermore, using Lorenz curve analysis Gini coefficient accounts 0.49 of total inequality. Factor decomposition of inequality typifies that property index and head social transition of household head take the greater share of 14.6% and 12.4% respectively.

Key Words: *Consumption, Poverty, Vulnerability to poverty, Inequality, urban Maichew.*

Declaration

This is to certify that this thesis entitled “Consumption base Measures and Analysis of Urban Poverty the case of Miahcew Southern Tigray” submitted in partial fulfillment of the requirements for the award of the degree of MSc., in Economics (specialization Development Policy Analysis) to the College of Business and Economics, Mekelle University, through the Department of Management, done by Mr./._Mensasbo Gebru Tesfay,Id.No._FBE/PR 0081/00_ is an authentic work carried out by him/her under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Name of the student Mensasbo Gebru Signature & date _____

Name of the supervisor(s) 1. Fredu Nega (PhD) Signature & date _____

2. Almat Hagos (MSc) Signature & date _____

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Acronyms

| | |
|-------|---|
| ADB | Asian Development Bank |
| BoFED | Bureau of Finance and Economic Development |
| CBN | Cost of Basic Needs |
| CSA | Central Statistics Authority |
| DAD | Distributive Analysis/ Analysis of Distributive |
| ETB | Ethiopian Birr |
| FGT | Foster Greer and Thorbecke |
| FAO | Food and Agricultural Organization |
| FGLS | Feasible Generalizes Least Square |
| FHHs | Female Headed Households |
| GLS | Generalized Least Square |
| Hhh | Household head |
| IMF | International Monetary Fund |
| Kg | Killogram |
| IDP | Integrated Development Plan |
| LPM | Linear Probability Model |
| MoFED | Ministry of Finance and Economic Development |
| MLE | Maximum Likelihood Estimation |
| MHHs | Male Headed Households |
| NGOs | Non Government Organizations |
| OLS | Ordinary Least Square |
| PPA | Participatory Poverty Assessment |

| | |
|--------|---|
| PASDEP | Plan for Accelerated and Sustainable Development to End Poverty |
| SNNP | Southern Nations and Nationalities People |
| UNDP | United Nations Development Program |
| USA | United States of America |
| UN | United Nations |
| UNICEF | United Nation International Children Fund |
| WFP | World Food Program |
| WHO | World Health Organization |
| WoFED | Wereda Office of Finance and Economic Development |

TABLE OF CONTENTS

| | page |
|---|------|
| ABSTRACT----- | 1 |
| AKNOWLEDGEMENT----- | 3 |
| ACRONYMS----- | 4 |
| CHAPTER I: INTRODUCTION----- | 11 |
| 1.1 Back Ground Information----- | 11 |
| 1.2 Statement of the Problem----- | 12 |
| 1.3 Objective of the Study ----- | 15 |
| 1.3.1 General Objective----- | 15 |
| 1.3.2 Specific Objectives----- | 15 |
| 1.4. Research questions- ----- | 15 |
| 1.5 Research Hypothesis----- | 16 |
| 1.6 Limitation and Scope of the study----- | 16 |
| CHAPTER II: LITERATURE REVIEW ----- | 18 |
| 2.1 Theoretical literature----- | 18 |
| 2.1.1 An over view of Urban poverty In Ethiopia----- | 18 |
| 2.1.2 Definition, Concept and Measure of Urban Poverty----- | 19 |
| 2.1.3 Wellbeing and Poverty----- | 20 |
| 2.1.4 Characteristics of Urban Poverty----- | 22 |
| 2.1.5 Determinants of Urban poverty----- | 23 |
| 2.1.6 Vulnerability to Poverty----- | 24 |
| 2.2 Empirical Literature----- | 26 |
| 2.2.1 Measurements of Wellbeing: Countries Experience----- | 26 |

| | |
|---|----|
| 2.2.2 Qualitative Participatory Assessment of Poverty----- | 28 |
| 2.2.3 Measuring and decomposing Inequality ----- | 29 |
| CHAPTER III. DATA SOURCE AND METHODOLOGY----- | 32 |
| 3.1 Site Selection and Description of the study area----- | 32 |
| 3.2 Data Sources----- | 34 |
| 3.3 The Filed work Procedure----- | 35 |
| 3.4 Empirical Models and Data Analysis----- | 36 |
| 3.4.1 Measuring Poverty----- | 36 |
| 3.4.2 Poverty Line ----- | 36 |
| 3.4.3 Decomposing the Poor----- | 39 |
| 3.5 Econometric Specification----- | 40 |
| 3.5.1 The Consumption Model----- | 40 |
| 3. 5.2 The Probability of Becoming Poor----- | 43 |
| 3.6 Determinants of Poverty Indices and Vulnerability to Poverty model----- | 44 |
| 3.6.1 Determinants of Poverty Indices----- | 44 |
| 3.6.2 Vulnerability to Poverty----- | 46 |
| 3.7 Inequality and Poverty----- | 47 |
| CHAPTER IV: RESULTS AND DISCUSSIONS----- | 53 |
| 4.1 Descriptive Analysis of the Survey data----- | 53 |
| 4.2 Empirical Results and Discussions----- | 59 |
| 4.2.1 Measuring poverty----- | 62 |
| 4.3 Econometric Results----- | 62 |
| 4.3.1 Determinants of Poverty (The Consumption Model)----- | 64 |

| | |
|---|-----|
| 4.3.1.1 Determinant of Consumption function (OLS result) ----- | 54 |
| 4.3.1.2 Determinants of Poverty Incidence (Probit Model result) ----- | 68 |
| 4.3.1.3 Determinants of Poverty Gap and Severity (Tobit Model result) ----- | 70 |
| 4.4 Extent of Vulnerability to Poverty (FGLS result)----- | 74 |
| 4.5 Inequality and Poverty ----- | 76 |
| CHAPTER V. CONCLUSION AND POLICY IMPLICATION----- | 81 |
| 5.1 Limitations ----- | 81 |
| 5.2 Conclusions----- | 82 |
| 5.3 Policy Implications ----- | 84 |
| References----- | 88 |
| Annex----- | 116 |

| LIST OF TABLES | Page |
|--|------|
| Table 3. 1 Social and Economic problems of Maichew Residents----- | 34 |
| Table 4.1 Household and Access to Service Facilities----- | 54 |
| Table 4.2 Summary of Description Statistics of the Survey data----- | 58 |
| Table 4.3 Poverty line of the study area----- | 60 |
| Table 4.4 Poverty Profile of the Population of the study area----- | 61 |
| Table 4.5 Multinomial Logistic regression of Social transition of HHh----- | 63 |
| Table 4.6 Result for OLS Regression (consumption function)----- | 67 |
| Table 4.7 Results for Probit regression----- | 70 |
| Table 4.8 Results of Tobit regression (Poverty gap model)----- | 72 |
| Table 4.9 Results of Tobit regression (poverty Severity Model)----- | 73 |
| Table 4.10 GLS Expected and Variance of the Expected consumption----- | 75 |
| Table 4.11 Results of Vulnerability to poverty----- | 76 |
| Table 4.12 Summary of quintile adult equivalent consumption expenditure Results----- | 77 |
| Table 4.13 Determinants of inequality----- | 79 |

I. INTRODUCTION

1.1 Back Ground Information

Poverty still possesses a major problem in most of the developing world. Empirical figures demonstrate that almost a billion people living in cities in developing countries live in absolute poverty and this number increases all the time. By many accounts, Ethiopia is one of the poorest countries in sub-Saharan Africa. Poverty in the urban differs from poverty in rural area by numerous facets. The most important and most obvious difference is that a person who is poor in urban is totally reliant on cash for survival; food, fuel, water and housing and are often more expensive in urban than in rural areas particularly in sub-Saharan Africa (Hagos and Holden, 2000; Baker and Schuler, 2004).

Since there is a difference between poverty in the urban and rural areas, it is not promising to use the same strategy for development cooperation projects in the different environment. They have to be adapted to specific needs. It is now widely recognizes that the rapid growth of urban populations lead to the worst in absolute and relative poverty. Unemployment and underemployment are major concerns for many urban developing economies. At least 600 million urban dwellers in Africa, Asia and Latin America live in housing that overcrowds and of poor quality, with inadequate provision of water, sanitation, drainage and garbage collection that their lives and their health is continually at risk (UN,2005).

The world faces severe and growing challenges to sustain higher wellbeing and meet the rapidly growing demand for various resources. Satisfying the demand for the ever increasing population is expensive given the very limited potentials. All governments make poverty reduction as part of their daily agenda, but how exactly poverty measures is the tricky issue (World Bank, 2005). Although different approaches exercise in measuring poverty, familiar (popular) approach ends up with money based measurement.

Traditionally, poverty measures in monetary term (insufficiency of consumption or income), but associates with unsatisfactory outcomes with respect to health, nutrition, literacy, social relations, insecurities, low self of esteem and powerlessness. It is now realizes that poverty is a multidimensional concept and should encompass all important human requirements and lack of income or consumption is not the only kind of deprivation people may suffer. Indeed, people can still suffer acute deprivation in many aspects of life even if they possess adequate income or consumption. Thus; recent thinking on poverty argues that poverty should be viewed in terms of inadequate standard of living, which is more general than lack of income or consumption (World Bank, 2005). Living standards are influenced by the degree to which households have access to suitable public goods. As a result, one aspect of non-income or non- consumption poverty has to do with a population's access to basic services (Ray, 1998).

Other dimension of poverty includes social deprivations: the inability to fully participate in communities and, perhaps, in religious life. Further aspects relate to physical deprivations, such as those relate with disability, disease, and under-nutrition, or vulnerability to a catastrophic loss (Sen, 1999). Poverty and poverty lines are not restricted to financial definitions only (Duclos, 2007). Poverty characterizes by a deprivation of access to essential goods, services, assets, and opportunities to which every human being is entitled. Poor households have to sustain themselves by their labor and be reasonably rewarded and ought to have a degree of protection from external shocks. In addition, individuals and societies are also poor and tend to remain so if they don't empower to participate in making the decisions that shape their lives (ADB, 2004).

1.2 Statement of the problem

There are no more visible characteristics of economic underdevelopment than poverty and are the most shocking characteristics which outshine layer after layer of inequality. Notions of poverty are necessarily link to some notion of well-being or welfare and well-being has a direct relationship with psychological, socio-economic, subjective and objective connotations (Biancolli, 2006).

High downside risk to income or consumption is part of life in developing countries. Climate risks, economic fluctuations, and a large number of individual-specific shocks leave these households vulnerable to severe hardship like chronic and transient poverty. There is increasing evidence that the lack of means to cope up with risk and vulnerability in it self is a cause of persistent poverty and poverty traps. In the developing world, little is known about urban poverty from quantitative evidence mainly due to lack of data tracking from the same households overtime (Kedir and McKay, 2003). Coming to Africa, the analysis of urban poverty dynamics hampers by similar problems and there is diminutive substantiation on such an important dimension of poverty. In line to the above points, the urban sector in Ethiopia has been largely uncared for and overlooked by researchers and policy analysts, and ignored in debates on poverty. This has resulted in a ‘rural bias’, which reflects in development policies and public debate in the country. McKay and Kedir (2003), carries on Urban Household Survey (UHS) in Ethiopia based on real total household expenditure per month and the welfare indicator results point out that there is high level of chronic poverty.

An estimate of 1995/96 shows that 45.5 percent of the population falls below the poverty line earns \$1/day (IMF, 2000). Urban areas account for only 15 percent of the total Ethiopian population, but have a high rate of incidence of poverty. The population of Tigray region reaches 4.314 million with population growth rate of 2.6% per year CSA (2007), aggravates for different socio- economic desires. Region’s potential to serve this high demand is too limited in physical and human resources, and puts pressure on heightens of poverty. According to the finding of MoFED in both urban and rural areas, Tigray regional state has the lowest per capita and per adult equivalent consumption expenditure as compared to other regions of Ethiopia (MoFED, 2002). Among the eleven regions of the Federal Democratic Republic of Ethiopia (FDRE), the five poorer regions put more to total poverty indices than to the over all population. Roughly

speaking, the sum of poverty indices of the five regions is higher than the national poverty indices. The regions are Tigray, Afar, Benshangul, SNNP and Gambella (See Poverty profile of Ethiopia, MoFED, 2002, page 34).

Analyzing the socio- economic characteristics of urban areas of the southern zone of Tigray mostly unnoticed by researchers and no detail socio economic study is undertaken previously except one by WFP (2008/09) which together with of UNICEF and Tigray Regional State commence poverty (food security and vulnerability) comparison across five towns of Tigray (i.e., Maichew, Mekelle, Adigrat, Zelambessa, and Adwa). By all poverty indicators like low asset holding, poor health service, inactive economic dynamism, unemployment, street children and orphans, vulnerability, and the elders without support; Maichew is the poorest town next to Zelambesa. More than seventy percent of monthly income of the society feeds to consumption, the highest in the region. Explicitly this is a cursor to what extent poverty ordinariness in the town (WFP et al, 2008/9). The economic activity rate of Maichew is below other similar zonal capital towns of Tigray region such as Adigrat, Adwa, Axum and Endaselasie (CSA, 1994).

The asphalt road Addis Ababa to Mekelle via Maichew is not targeted in a way to benefit the town. Consequently, business firms engage in the service area like hotel, restaurants, bars and cafes at this instant migrate to towns closer to the main road to Mahoni, Alamata, Hiwane or some where. Poor interaction of the society with other areas radiates from the remoteness to road is other manifestation of inactive social interaction (Mathewos, 2008). In addition to this, the root cause for the existing of severe poverty in the town includes inadequate skill of households, unemployment, and vulnerability (IDP, 2007). Annual budget of the town (83%-86%) allocates for recurrent capital implies that much of the money goes to employees pay without enough working capital and investment (WoFED, 2007).

Measuring and analysis of poverty, vulnerability to poverty, inequality of the town becomes sound enough to put an agenda on the poor, targeting of the policy makers in intervening on that area ,evaluating the intervention packages gear toward the poor, and check and balance the effectiveness of the public institutions. The dimensions of poverty, vulnerability to poverty and in equality in the town estimate from the demand side (consumption expenditure

in per adult equivalence) given that results from consumption-based estimates of poverty are more robust than income and others.

1.3 Research Objective

A great deal of development policies indeed now assesses throughout poverty criteria and this carries out among things from end to end. Hence the study has general and particular objectives.

1.3.1 General Objective

The major objective of the study is to estimate the extent of poverty in Maichew town and analysis the socioeconomic condition of the society from the demand side (consumption approach), so as to provide basis for appropriate poverty mitigating and preventive programs.

1.3.2 Specific objectives of the study

Poverty measurement and analysis might serve a number of purposes among which specifically:

1. To differentiate the poor individuals or groups from the non-poor
2. To identify whether the poor area or poor people
3. To develop poverty profiles of the society and estimate total inequality
4. To examine basic determinants of welfare indicators and vulnerability to poverty
5. To define threshold for public transfers (intervention) by monitoring poverty rates across different subgroups of the population.

1.4 Research questions

The whole task of the study revolves in answering the following key questions.

1. Who are the poor?
2. Poor people or poor area?
3. What poverty indicators are used in the town poverty profile (in equality, vulnerability etc)?

4. What are the basic and immediate (proximate) determinates of poverty, poverty severity and vulnerability to poverty?
5. What programs supposed to be intervened to reduce the magnitude and extent of absolute poverty and preventing the non poor from joining to the poor?

1.5 Research Hypothesis

The town's economic growth has not been changed and structurally transformed for many years; rather there are some signals of economic stagnation. In particular the formal economy shows a declining trend in terms of employment generation and economic growth against population growth. This is mainly due to the route diversion (Alamata- Hiwane via Mehoni instead through Maichew) for a significant period of time. Even now the economic activities in the town evidence for languish development and low level of tricks mainly drives from the main road diversion.

1.6 Scope and Limitations of the study

1.6.1 Scope of the Study

Conducting a research about urban poverty is broad and has multi- dimensional application. Thus, this paper concentrates on measuring the severity of poverty and analyzes the socio- economic status of the residents of Maichew town and it delaminates to the following main points.

- ❖ Consumption based (Cost of Basic Needs) approach estimating of poverty line and develops the poverty profile and vulnerability to poverty of households.
- ❖ Estimate the basic determinants of poverty and vulnerability to poverty in the sample population using different models.
- ❖ Rationalize which part of the society is the poor, determine inequality and out line coping mechanism from poverty.

1.6.2 Limitations

Methodologically the study limits to generate demand side information about welfare of households in Maichew. Using cross sectional data to analysis vulnerability to poverty, we miss the effect of aggregate or inter-temporal shocks i.e., the distribution of consumption across household and management of distribution instruments. Finance limits us in size of the sample survey to 205 households only.

II. RELATED LITRATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 An Over View of Urban Poverty in Ethiopia

Ethiopia is a country where the majority of the population is poor and there is significant variation in individual and household level experiences of poverty (Hagos and Holden, 2000; Woldehana, 2004). The country is the third most populous, but least urbanizes in sub-Sahara Africa and one of the world's poorest by any standard (Bigsten and Shimles, 2005; Demeke et al, 2006; UNDP, 2008; Bogale and Korf, 2009). According to the World Development Report, the country has the lowest GNP per head in the world, and its purchasing power parity adjusts to GNP ranks 200th out of 206 countries (World Bank, 2000). Human development indicators of the United Nations Development Program (UNDP, 2008) also attest to the seriousness and extent of poverty in the country.

Low per capita income brings low Human Development Index (HDI) and Ethiopia is the sixth lowest out of 175 countries in the world (Bogale and Korf, 2009). Likewise, the Human Poverty Index (HPI) ranks Ethiopia 91th out of 94 developing countries (UNDP, 2003). The urban sector in Ethiopia largely abandonees by researchers and policy analysts, and ignores in debates on poverty due to lack of reliable household survey data (Kedir, 2005; Alemayehu, 2006) and results in a 'rural bias' (Dercon, 1999; Assefa and Kasahun, 2005) which reflects in development

policies and public debates in the country. Despite the fact that urban poverty in the country tends to give up from the above perspective, little studies conduct mainly by action-oriented organizations like NGOs and academic researchers. According to their finding, high rural-urban migration rate aggravates the incidence of urban poverty in some towns of the country. Using CBN approach in Awassa, Addis Ababa, Dessie, Mekelle, Jimma, Bahir Dar, and Dire Dawa; incidence of urban poverty tends to be high and accounts as 47% (Dercon and Tadasse,1997).This implies that quantitative studies of urban poverty in Ethiopia increasingly look at both its static and dynamic (Kedir, 2005; Islam and Shimels, 2005).

Official statistics points out that the level of urban poverty in Ethiopia is 37% in 2002 (MoFED, 2002). Out of the estimated total urban population of about 11 million, nearly 4.1 million live in a state of poverty and misery. Four household surveys from 1994 to 2000 carry by Gebremedhin and Whelan (2006) show that poverty is high in urban Ethiopia. Similarly, in two rounds of household surveys in 1994 and 2000, poverty estimates reveal that there is high degree of deprivation in urbanite of the country. Hence, head count index of 41% and 43% record in two round surveys respectively (Alemayehu, 2006).

2.1.2 Definition, Concept and Measure of Urban poverty.

In this section, we deal with the ways and approaches in which economists depict the concept of poverty and the devices of addressing it. In relation to this, we pact much with the theoretical foundation for the approaches that economists develop to measure and analysis of poverty and vulnerability to poverty in urban context.

Eventhough little is known about urban poverty in developing countries due to lack of quantitative data and rural biased (Masika et al, 1997; Dercon, 1999; Ravallion, 2001; Woldehana, 2004; Hussein, 2003), in recent years an extensive body of literatures come out on the definition, concept and measures of poverty (Kedir, 2003; Baker and Shuler, 2004; Bigeston and Shimles,2005).The World Bank (2000), defines poverty crudely as a pronounced deprivation in well-being. According to this definition, people with greater command on resources are better off in meet household or individual needs. Masika et al(1997) and Enquobahrie (2004), define

poverty as a situation in which the underprivileged don't have adequate food and shelter, lack of right of admission to education and health services, expose to violence, and find themselves in a state of joblessness, vulnerability and powerlessness. According to them, poverty is multi-dimensional and looks through variety of indicators such as levels of income or consumption, social indicators and cursor of vulnerability to risks and socio-political admittance and participation. Exclusively to urban poverty, it demands better tools and techniques to differentiate from general poverty since urban poor is more heterogeneous, problematic and segregate socio economically and hard to cost effectively target the poor (Masika et al,1997; Fay, 2007). Matters incorporate in defining urban poverty from the worldwide pace are of urbanization, the scale and measurement of urban poverty and its spatial and social dimensions. Following this, urban poverty is complex in its nature and difficulty of understanding (Mitlin, 2006).

Poverty in Ethiopia prolongs and defines it as multidimensional enlarges beyond the low level of income or consumption. Woldehana (2004), delineates four dimensions of poverty in Ethiopia. Material deprivation (lack of opportunity) is the first dimension. Low capabilities manifested by low attainment in education and health are second most dimension. Vulnerability and voicelessness characterize by exposure to risk or low level of security and powerlessness respectively are third and four dimension of poverty. Once we define poverty, next step rests on how to measure it. The central point of measuring poverty is to address the poor from non poor so as to design a sound intercession program to mitigate it and how it compares across countries, regions, or socio-economic groups (Duclos, 2007).

2.1.3 Wellbeing and Poverty

Economists in developing countries generally concern with poverty and its measurement in terms of income or consumption. Behind this money metric scale lays the concept of utility, i.e., wellbeing (Hussian, 2003; Gandhi et al, 2004). This is the most conventional view of poverty and it is the starting point for poverty analysis (World Bank, 2000; 2005). Kingdon and Knight (2004) carry out a study in India using panel data, *citrus paribus*, higher level of wellbeing characterizes as non- poor and strongly associates with the material context. This implies that a

person having a command on commodities is an indicator of non-poor. On the other hand, using different source of data Mboup(2003), demonstrates that social marginalization, geographic isolation, domestic violence, as an indicators of deterioration of wellbeing than power on goods command in Kenya. World Bank (2005); Araar (2006), develop two approaches of assessing wellbeing. The first approach concentrates on comparison of economic wellbeing of individuals which is money- metric measure of poverty and the second approach practices mainly by social scientists than economists is multidimensional complement to standard of living approach. Kedir (2005), conducts a study on urban Ethiopia and he finds that money metric and capability approaches of measuring wellbeing are widely practiced.

Keeping with the welfarist approach comparison of poverty, the money- metric indicator (i.e., lack of commands on commodities) of poverty subjects to adjustment for difference in need, price, and household size(Deaton and Zaidi,1999; Mitlin ,2006) and this comparison clearly denotes far from the perfect indicators of wellbeing and indeed economic theory tells us little about how to use income or consumption to make consistent comparison of wellbeing. This approach inhibits to reflect fully the role of public goods and non-marketable commodities on wellbeing which are valued using shadow price(Araar,2006; Watkins, 2005; Clark,2007).Baulch and Eduardo(2002), using panel data of 1990s in Vietnam verify that money metric approach to be less persistent to measure poverty than non monetary in primary and lower secondary school enrolments. Money-metric measurement limits to figure out issues of vulnerability and risk, power distribution, exclusion and prejudice, and human rights violation (Osterrieder, 2005).

Arguments are deep rooted on the concept of wellbeing and poverty. The basic needs or functioning approach and capability approaches are mainly the dominants (Clark, 2007; Araar, 2006). The basic needs approach characterizes a physical input usually required for achieving of functioning indeed important to provide a snapshot of the poverty situation in the globe and use as a strong advocacy tool (UN,2005). But the question of priorities has not yet been solved on an international level by fulfilling the basic needs only (Osterrieder, 2005). As a result, basic needs are a means rather than the ultimate outcomes. The second alternative comes within reach of poverty measurement by means of wellbeing assessment is the capability approach promotes by the work of Sen (Sen, 1999).The notion of capability goes far distant from the achievement of

specific outcomes or functions like good health, well clothed, being literate, and community participation. In simple language, the distinction between the capability and functioning approach elucidates as follows. Consider income or consumption as an indicator of living standard, having more income or consumption refers to developing capability or ability to consume more. Consumption at this occasion is an outcome or functioning (Sen, 1999) which means a person consumes more and becomes strong and healthy as a result of consuming the recommended diets and this outcome powerfully derives from the exercise of the capability or ability (Clark 2007). Consequently, having low or high capability is the forerunner of poor and non-poor respectively (Araar, 2006). The advantage of this approach is that it allows whether individual is capable or not to get the outcomes (functionings). The shortcoming of the approach is it fails to distinguish between basic, internal, and combined capabilities (Nussbaum, 2000).

2.1.4 Characteristics of Urban Poverty

Poverty lessening tools and approaches developed for rural will not work in urban areas, for the reason that urban poverty is different in its nature from rural counterparts (UNDP, 2007). Urban sectors share of the poor population in a developing country increases and convex function of its share of the total population. As the dimensions of poverty are many, there are subsets of characteristics of urban poverty which are more pronounced and require specific analysis (Mboup, 2003). At the same time, as a result of rural to urban migration, the number of poor in urban area is probable to rise in developing countries (Masika et al, 1997; Todaro, 2004; Deolalikar and Dubey, 2003). Baker and Shuler (2004), outline clear-cut and indispensable characteristics of urban poverty that is quite different from their rural complement i.e., (i) commoditization or reliance on cash economy for food, fuel, housing and are often more expensive in town than in rural areas. More than 60% income of urban poor spends for consumption on agricultural products and more suffer from higher food prices (Fan et al, 2006). (ii) overcrowding living condition (slums). While towns become more modern, the growth of slums lead to pollution problems, unemployment, deficiency in basic services, and food insecurity issues (Mboup, 2003). For that end, World Bank launches antipoverty projects to cope up the problems. (iii) environmental hazards derive from stupidity and perilous location of settlement and expose to multiple pollutants. Crime and violence are highly pervasiveness in

urban than rural. Enquobahrie(2004), using a time series data of 1992-1998 in urban Ethiopia shows that the existence of large number of poor people and the dominance of economic inequality may bring social tensions which encourage various criminal acts .

2.1.5 Determinant of Urban Poverty

A poverty profile depicts the blueprint of poverty only, but not principally concerns in explaining its causes (World Bank, 2005). Yet a reasonable clarification of why some people are poor is essential if we are being able to tackle the roots of poverty. Talk to determinants of poverty generate from different sources and found to differ among models. The first approach is regressing percapita consumption against a series of independent variables. The second approach is to run a probit, or logit regression, where the dependent variable is a binary variable with 1 represents the individual being poor and 0 the non-poor. But Coudouel et al (2004); Simler et al (2002); and Fagnäs et al(2007), seriously criticize the second type of model owning from artificial construction of the dependent variable, information with reference to the actual relationship between the level of consumption and the dependent variable is lost.

Two cautions are in order in analyzing determinants of poverty. First, the difficult is to separate causation from correlation. For instance, poor people tend to have low level of education; but are they poor because they have little education, or do they have little education because they are poor. A statistical coalition alone is not enough to establish causality, and additional information is likely to be required. Second, most “causes” of poverty are identifying immediate or “ proximate” causes, but not inevitably “deep” causes, such as low levels of education do indeed increase the risk of poverty(World Bank,2005). Data of 2004-05 Household Expenditure Survey (HES); address that household size, race and regions are significantly determinants of poverty outcome in urban Malaysia (Mok et al, 2007).

Similar study runs in south east Africa using data from a survey of 593 black households suggests that major determinants of household poverty in both rural and urban areas are education and household size (Zake and Naudé, 2002). Using the panel data in urban Ethiopia (Kedir, 2005) finds that household size composition; economic activities of household head and

schooling are crucial factors of urban poverty. Likely, Pfau (2008), conducts a research in Vietnam using Vietnam Household Living Standard Survey of 2004 indicates that; ethnicity, working status, residential regions, household living arrangements, household composition, household head characteristics, as well as receipts of social security benefits and remittances found to be the basic determinants of urban poverty. Bigsten and Shimeles (2008), carry out a study on urban poverty in selected seven major cities of Ethiopia using 1500 households and with more family size by all dimensions of poverty indices found that urban population are chronically poor. Kedir (2005), goes through a new road to the analysis of poverty dynamics in urban Ethiopia and strives to assess the characteristics of poor and factors affecting chronic and transitory poor using both descriptive and econometric tools and finds the same result as the above one.

2.1.6 Vulnerability and Poverty

More often than not, the concepts of vulnerability and poverty are overlapped, but are not indistinguishable (Adesanoye and Okunmadewa, 2007). Technically, vulnerability defines as the susceptibility or sentiment of income or consumption of an individual, household, or community to external shocks (covariant or idiosyncratic) and wavering associates with something detrimental in the future such as, market risk refers price oscillation, wage inconsistency, and redundancy (UNICEF, 2009); political risk pacts with alteration in subvention or prices, income shift, and civil quarrel (Chaudhuri, 2003); community risk concords with lessening in community prop up and entitlements (Masika et al, 1997; World Bank, 2000); health risk disclosures to disease that put off work (Masika et al, 1997; Jha et al, 2008), an outdoor side of risks, upsets and pressures; and an inner side which is defenselessness, meaning lack of means to mess through without damage or loss (Schütte, 2004). In general, vulnerability is ex ante anticipation of the welfare level of individual; while poverty is ex post ante consciousness of welfare of an individual or community below certain cutoff point i.e., poverty line (Chaudhur, 2003; Jha et al, 2008).

Azam and Imai (2009) develop recent effort on the subject of vulnerability. They define vulnerability and its discrepancy with poverty at large and confirm through a survey on

household income and expenditure data of 2005 in Bangladesh that poverty and vulnerability are not alike. Following this thinking, substantial share of those currently above the poverty line will be vulnerable in the future and will join to the poor. Jha et al(2008),make similar study in Fiji, using household survey data find that vulnerability is the expected poverty but they don't see the relationship between vulnerability to dynamic nature of poverty. Chaudhuri (2003) and Jamal (2009) appraise vulnerability to poverty and conclude that the notion of vulnerability in the context of poverty is not as develop as the meaning and measurement of poverty because we are able to estimate or make inference about whether a household at this time is in danger to future poverty.

Scholars akin to Lankao and Tribbia (2009), argue that urban vulnerability should assess and importantly depends on the circumstance. Poorer groups in Lusaka are vulnerable for lacking drainage and good quality housing, and for straighten out on sites at risk from flooding, whereas the determinants of vulnerability in the USA might recount to the quality of physical infrastructure and land use planning. In developing countries idiosyncratic or covariate shocks only are not the merely chief sources of vulnerability rather escalates size of elders with less precaution in their livelihood is also a challenge to public policies. Household with greater elders face sound vulnerable to poverty in Vietnam (Long and Pfau, 2008).

Research on intrinsic urban vulnerability makes fundamental contribution to the understanding of both the determinants of vulnerabilities across and within urban or groups (Lankao and Tribbia, 2009). The same move carries in three urbanism of Afghanistan and assures that within certain groups, disparity do exist, and it is not the social group per se that is vulnerable, but certain households and individuals in the right place to these groups (Schütte, 2004; Dang,2009).

2.2 Empirical Literature

2.2.1 Measurement of Wellbeing: Countries Experience

Assessment of welfare through the consumption expenditure approach i.e., uni-dimensional finds an extensive application in recent years in worth of wellbeing (Costa,2003; Meyer and Sullivan,2007). However, appreciation and sensitivity to the sense of wellbeing and quality of life that people enjoy depend on a holistic view of their circumstances and on the understanding of many factors that determine the setting under which they live (Trinidad and Tobago, 2006). Although the consumption expenditure is crucial for weighing up the level of people's welfare and calculating important welfare measures such as the poverty headcount rate, gathering such data requires significant time and effort (Costa, 2003; Sumarto and Suryahadi, 2006). In this sub topic, we look at empirical evidences of other approaches at household and aggregate level as simple alternatives to use consumption expenditure.

According to Araar (2006), a number of theoretical and methodological issues and criticisms raise concerning the application of the consumption approach in general and in estimating its impact in countries in particular. A look into literature indicates that, at least at the theoretical level, a large number of criticisms, particularly those related to economic theory, are in one way or the other, link with problems in the details of specific studies, such as how the questionnaire prepares, data collect and analyze. Unlikely, many literatures point out that in recent years, a very rudimentary consumption expenditure of poverty studies at disaggregate level conduct in developing countries. In 1990, 37 million of Indonesia people were below a dollar a day which is in abject poverty and the government has designed a five year plan of antipoverty campaign. However, the designing and implementing lineup was mired by lack of poverty information at a disaggregate level. Most important and utmost effort exert to tackle the challenge is to produce small and specific area poverty estimates by classifying all villages in Indonesia as either poor or non poor (Ahmed and Goh, 2007).

In reality, however, a number of challenges incorporate in the consumption expenditure approach. It requires assortment of time and effort, sufficiently large dose of patience, enthusiasm

on the part of respondents, plenty trust on the part of the enumerator to hand over, evoke of respondents in their non-food disbursement ends the last 12 months. In the face of these difficulties, a number of lessons in developing countries try to address this pragmatic problem by putting up a proxy for using up expenses for appraising of poverty. One of the most extensively cited studies on approximation of household spending is Filmer and Pritchett (2001) which use the Principal Component Analysis (PCA) method to reckon long-term household wealth in India and exploits school enrollment as an explanatory variable. Geda et al (2001), from 10,000 households survey data of 1994 in Kenya, using order logit model, higher welfare strongly associates with towering of education. In fact, expenditure data frequently use solidly to measure poverty; while numerous studies exercise the Principal Component Analysis (PCA) or Multiple Correspondence Analysis (MCA) method not to estimate a proxy for outlays, but straightly to measure poverty on a broader span.

More to the point of consumption, the multidimensional concept of poverty in a nutshell argues that further dimensions such as health, education, societal status, and leisure also include. Non income or non- consumption data turn out to be crucial in this case. According to Sumarto and Suryahadi (2006), three looms appreciate in quantifying of welfare in the face of difficulties in attaining household spending and income data and to come across variables that predict poverty the best. The earliest one is consumption correlated model which compacts without the midst of the per capita consumption of household as a dependent variable rather with the predictors of poverty in general.

In contrast to the determinants model, the endogeneity of the right hand side variables in the correlation model is not a distress. But the use of the consumption correlates model to envisage poverty status convinces flaws like estimate a model of consumption correlates does not yield in a straight line a probabilistic statement on the subject of household poverty status. The most important assumption behind the use of consumption correlates model is that consumption expenditure allies negatively with poverty. Therefore, factors setup to be positively link with consumption are implicit to be automatically negatively associate with poverty. On the other hand, some factors may be positively interrelating with consumption but only for those who are already above the poverty line.

The second approach is Poverty Probability Model (PPM). In contrast to the consumption correlates model, the left hand side of the estimation model is a binary variable of the poverty status typically limited dependent variable. Serious dispute from the advocates of consumption model predictors is that using a probit/logit model assaults unnecessary loss of information in transformation of household consumption data into binary variables of household poverty status. Except few exceptions, results are consistent in the two approaches in Indonesia. The third approach is Wealth Index Principal Component Analysis (WIPCA). This approach institutes by criticizing the use of binary data that pose a difficulty in ranking households by their socio-economic intensity. By a mass data only on assets ownership, the wealth ranking of households ascertain through the conception of a wealth index without demanding of dependent variable. Of course, data on assets ownership is characteristically accessible in the form of binary variables (yes or no), demonstrating merely whether a household be in possession of definite kinds of assets or not and acquiring of quality or price of each asset owned by a household to appropriate weigh up.

2.2.2 Qualitative Participatory Assessment of poverty

At the moment, Participatory Poverty Assessments (PPAs) are seeing as an indispensable element of any research to verify the type and level of poverty and deprivation in any country in general and urban poverty in particular. Trinidad and Tobago (2006) conduct a research in 17 selected communities of St.Lucia plus reinforces the poverty assessment schedule by broadening stakeholder contribution, generating an immense amount of qualitative data to harmonize the quantitative data produce from the Survey of Living Conditions (SLC), Household Budgetary Survey (HBS), inspiring the analysis, and intensify the sympathetic of poverty from the perspective of the poor. Jemal (2009), carries similar study in 15 countries, participatory assessment brings quick observation on the poverty status of the society.

Confronting each other interface and on-going dialogue with the key informants is a key ingredient of the data collection process, and various methods use to guarantee the active involvement of all stakeholders in the compilation, analysis and clarification of data. Information

triangulation makes certain use of a number of data assortment methods to get hold of, check from several sources, to put on multiple perspectives of the experience, impact of poverty and deprivation and to make comparisons between urban and rural poverty. Data obtain from observation, collected through questionnaires, cross-examination, and in spotlight discussions generate from community inhabitants as they partake in the community workshops in an interactive manner.

The life stories of the community confer their perspective on poverty, and describe their reality of being poor and of growing up and living in poor families and in poor communities. In the PPA they give several opportunities to voice their feelings, discuss their problems and concerns, to make out their survival and coping strategies, and to articulate their needs. Their voices not only ring true but also they provide insights into the fundamental cause and factors that determine and perpetuate their impoverished circumstances, and they boost the understanding of their struggle to survive in malice of their feelings of powerlessness and hopelessness. The data are therefore valid and reliable and they must be used as the basis for developing poverty alleviation programs so as to improve the living condition of the poor community.

2.2.3 Measuring and Decomposing Inequality

Inequality has many dimensions and statically link with poverty (Araar and Timonhy, 2006). Economists are concerned specifically with the economics or money metric dimension of inequality related to individual or household income or consumption. However, like poverty, this is just one outlook and link to inequity in skills, education, opportunities, happiness, health, life expectancy, assets and social transition. Inequality in the above points increases in many developing countries and this inequality harms the development process as it slows down poverty reduction at given growth rates, and may even reduce growth itself (Pieters,2009).Then, it is good to give alertness to the relationship between welfare inequality which is measured and unmeasured (Heshmati, 2004). Following the method developed by Araar (2006), the notation found in consumption distribution is a vector of expenditure $X = (X_1, X_2, X_3, \dots, X_n)$, where X_i indicates consumption of the i^{th} household in a society consisting of n individuals. Consumption

expenditure is a continuous random variable bounds in the interval ($X \geq 0$), the density function and the distribution function express as:

$$(2.1) \quad F(X) = \int_{x_0}^x f(y)dy$$

$$(2.2) \quad \Phi(X) = \frac{1}{N} \int_{x_0}^1 yf(y)dy$$

The density function $F(X)$ against the distributional function $\Phi(X)$ depicts the Luzerne curve (1905) which represents the inequality of consumption distribution and its equation looks as follow:

$$(2.3) \quad L(P) = \frac{\int_{x_0}^x f(y)dy}{\frac{1}{N} \int_{x_0}^1 yf(y)dy} = \frac{1 \int_{x_0}^x y(y)dy}{N}$$

The numerator $\int_{x_0}^x f(y)dy$ sums the consumption expenditure of the bottom X (the poorest population) and the denominator $\int_{x_0}^1 yf(y)dy$ is the sum of consumption expenditure of all. L(p) thus points toward the cumulative percentage of total consumption hold by a cumulative proportion X of the population, given individual household is well thought-out in increasing consumption. The advantage of Lorenz curve is to estimate the Gini index and other measures of inequality and poverty. However, an important drawback of the traditional model of the Lorenz curve is lack of satisfactory fit over the entire range of a given consumption distribution and the estimation is sensitive to errors in survey data.

Breaking down the contribution of the variables to welfare inequality is another point of discussion. Information contains about welfare function estimated by a standard semi-log regression answers only how much welfare inequality accounts for by each explanatory factor. Past literature provides approximate regression-based answer to welfare variation function and how much welfare inequality accounts, but not exact how decomposition has been available. In two most recent papers, Fields (2002) and Morduch and Sicular (2002) develop new frameworks for inequality decomposition footed on the regression-based decomposition that it enables identification as well as quantification of root causes or determinants of inequality. Though the method is vastly flexible, accommodating characteristics and popular, it has a number of

limitations that severe restrictions impose on the functional form of regression model used (see. Guang Hua Wan, 2002, Pitfalls of Regression-based inequality decomposition).

III. DATA SOURCES AND METHODS

In this chapter we deal with some features of the study area pertaining to poverty and its growth difficulty. Data capturing mechanism and methodological issues for analyzing of welfare, determinants of poverty gap, poverty gap square, vulnerability to poverty, and its determinants and welfare inequality are illustrated exhaustively. Though the geography of the study area is closer to the central part of the country, it is unfortunate that still now there is no any private investment that creates a positive multiplier effect to the society. Concerning resource and infrastructure the study area is in a good position and selected as a “growth corridor” i.e., the potential area of the region owing to good climate fertile for dairy and for any kind of crops, good potential of ground water for commercial and irrigation, good quality of infrastructure akin to road and power supply, tourism area, monasteries and hot spring water etc(Mathwos,2008).But such resources are motionless with out any benefit to the region in general and the town in particular.

3.1 Site selection and Description of the Study area

Maichew town divides into four kebelles and administers by the town’s council. The land use types comprise residential, commercial, open spaces, industrial, institutional and religious areas. The town has high-density settlement which contributes to poor sanitation. Most of the houses construct from locally available low cost materials. Housing scarcity, poor urban services, low level of economic dynamism and high rate of unemployment are the dominant characteristics of the town. The present total population of the town estimates as 23,484(i,e male 11,057 and female 12,427) and the number of households situate in the town are 4567. The dominant ethnic

group in the town is Tigray accounts 96 %, Amhara stands second with 3.7 % share, Oromo and Agew take the remaining 0.03 %(CSA, 2007).

Region wise, Maichew town identifies as a growth corridor (potential center for growth) which compromise five weredas of the southern zone of Tigray (Almata, Alaje, Endamehoni, Raya Azebo, Ofla) and two weredas of South eastern Tigray(Enderta and Hintalo Wajrat). According to the strategy of PASDEP document, for the coming few decades it is remarkable as an influential area in which agriculture is a dominant sector and its role in Raya Valley Integrated Development corridor and surrounding areas (Mathewos,2008). However, the town never gets any considerable investment opportunities in the last decade except the Particle Board Factory by Dejena Endowment. Commodity tax decreases at a higher rate from 36.87 %(2004/05) to 10.3% (2006/07) from the total share of town's revenue. Contrarily, public expenditure increases on average of 23.5% from 2004 - 2007 while town revenue increases only by 6.5% with the same fiscal years. This typifies the potential for development of the town is significantly crumpled (WoFED, 2007).

The poor dynamism in development of the town mainly lays on the passive interaction of the society that emanates from remoteness to the main road and the institution which governs the town. The administration is so passive that there is no any societal mobilization to participate in the development endeavors and reluctant to use any means of advertising to magnetize investors. Therefore, even though there are adequate resources, unless the society and administrative institutions walk up to deploy these, it is not surprising that poverty is deep rooted in the town.

The near to the ground level economic dynamism in the town also manifested by the minute level of the income of the residents (IDP, 2007). This low level of income couples with large family size aggravates depth of poverty in the town. The following table 3.1 typifies ranking of chronic problem of the society and household. In general, among the social and economical evils, poverty ranks as the leading problem of the society and the individual. In this respect, with the current ever increasing good's prices in the country, it becomes difficult for the great majority of the residents to make a moderate living.

Table 3.1: Social and Economic problems of Miachew Residents

| S.No | Needs/problems | Household level priorities | Rank | Community level priorities | Rank |
|------|---------------------------------------|----------------------------|------|----------------------------|------|
| 1 | Housing problems | 216 | 3 | 134 | 3 |
| 2 | Social & economic Unemployment | 235 | 2 | 91 | 5 |
| 3 | Poverty | 261 | 1 | 159 | 1 |
| 4 | Market | 143 | 5 | 123 | 4 |
| 5 | Infrastructure/roads, drainage, waste | 197 | 4 | 148 | 2 |

Source: Mathwos, 2008.

3.2 Data Source

The data use in this study is mainly primary and cross sectional for the year 2009. Household survey considers as the main source. Data collection process undertakes through a face to face (personal) interview with the households using household consumption expenditure (HCE) questionnaire. The list of households for this purpose draws from 2007 town enumeration. A total of 210 households include in the survey. The study also encompass secondary data from the Wereda (WoFED), Regional (BoFED), national (MoFED and CSA) and other relevant documentary sources.

A standardized multipurpose questionnaire is prepared to collect data and six enumerators and one supervisor hire for this purpose. The content of the questionnaire includes all the variables which are very important for the measuring and analysis of poverty and vulnerability to poverty in the study area. Accordingly, it designs to comprise following sections. Firstly, household characteristics: focus on the size of household, dependence ratio, employment of

household head, type of work of household head, gender of household head, age of household head, educational status of household head, consumption expenditure pattern of household with listing of nine categories of food items and six categories of non food items include in the survey. This section also takes in to account a series of questions about socio-economic characteristics of households.

Secondly, community characteristics enclose access to market, access to credit, access to road, sanitation, employment opportunities, municipal services, and etc. Thirdly, individual characteristics deals with the personal attribute of the members of household such as age, sex, educational status, ethnicity, religion, and etc.

3.3 The Field Work Procedure

After designing the draft questionnaire, the field procedure consists of two days training to data collectors as well as to the supervisor. The training schedule runs in two stages. The first stage focuses on the definition, concepts and principles of interview and how to complete the questionnaires. The second stage is post training period; it aims to examine the practical difficulties pertaining to the various socio-economic groups, which would like to be encountered during the actual work. For that end, we select a random sample of two households from each kebele and a total of eight household heads interviewed by the trained enumerators. The purpose of the pre-testing focus to make some possible modification in the design of the questionnaire based on the responses so as to make it understandable for both respondents and to enable the interviewers to meet the objectives of the survey (i.e., assuring clarity, understandability, and completeness of the data quality).

The collected data are entered to STATA version 9.2 software and check whether the models specify in each topic of the paper are appropriate or not. The sensitivity of the subject matter and pattern of response also assess and take corrections accordingly. Finally, selection of household respondents from each kebele takes place through the simple random sampling technique and the survey covers from 30th September 2009 and continues for seven successive days. The pre-test results aren't including as an input in the final analysis. Until the end of the

survey period, the enumerators collect the information by interviewing the respondents and fill out the questionnaire, submit to the supervisor on daily basis and then check and correct in view of that. Data quality also maintains via minimizing the duration of data collection (September, 2009) on price and total household expenditure. Therefore, by doing so, data contamination assumes to be conical.

3.4 Empirical Models and Data Analysis

3.4.1 Measuring Poverty

In this sub topic the econometric models which are appropriate for the study are deployed exhaustively. Current practice starts from the common by identifying a single monetary indicator of household's welfare; let the welfare indicator value for the i^{th} household denotes by Y_i . This tends to be total expenditure of household on consumption over some period of time to the extent that strongly correlates with the concern of human poverty. Total household's expenditure per a given m month looks like as:

$$(3.1) \quad Y_i = \sum Z_i$$

Y_i refers to the total household's expenditure on food plus non food items and Z_i is expenditure on the respective item by household members on current consumption. Since the household's total expenditure on all goods is consumed by all members of household living in one roof, assuming all members of household share the same amount of goods consumption and then construct per-capita consumption expenditure for all individuals with equally value. Then, Y_i converts to household's average expenditure (y_i).

$$(3.2) \quad y_i = \frac{1}{N} \sum Z_i$$

Where N refers number of household members in a given household, y_i per capita expenditure. However, per capita consumption of heterogeneous household members misleads to give exact amount of consumption by each household member, and decreases with household size since it differs across age and sex (Coaldale et al, 2004; Araar, 006). Therefore, follow economies of scale by transforming the number of adult in to adult equivalent scale. This leads to determine

adult equivalent scale econometrically (Deaton and Zaidi, 1999). Nevertheless, a number of problems are associated with this approach and a method widely used by researchers is scales household consumption by adult equivalent using standard scale adopted by WHO quoted on (Dercon, 1998) (See annex table 6 age-sex structure of adult equivalent).

In measuring the welfare of household, it might not argue that only food items; the ultimate needs also incorporate in the formulation of consumption model, such as durable goods consumed today but may not actually purchase at the time of survey and goods purchased at the time of survey but not consumed all today (Todaro, 2004; Araar, 2006; World Bank, 2005; Mock et al, 2007). To make a sense of harmony in the consumption model, durable goods and asset owning are patented in the form of wealth and asset indices which further disaggregate into various kinds of indices like property index denotes by owning of durable goods such as a radio, fridge, bicycle, TV, motorbike, motorcar/truck, mobile phone, landline phone, modern bed, table or chair and sofa, service index deals with service equipped to residential house like light, sanitation, water, cooking fuel and housing quality index represents by the number of person per room and the materials of the wall, roof and floor of the house is made of. This measure of household prosperity takes a value between zero and one, with a higher value reflects wealthy household. We also construct an asset index that includes consumer asset and productive durable goods owned by the household. This index also ranges from 0 to 1, with a higher value asset index typifies asset worth household. (See Annex 8 the method for calculation for property, service and housing quality indices),

Another durable good taken into consideration when investigating welfare of household is the value of housing service which is part of consumption and its consumption rate currently is satisfactorily estimated by survey data of house owners by asking how much you would have to pay if rented. Current household consumption doesn't entirely associate with household expenditures on food and non food rather on windfalls consumptions also incorporate such as aid, gifts and remittance. Hence, the current consumption is the sum total of the above and own production. Finally, the respective households' total consumption expenditure on all goods and services estimates in real per adult equivalent scale i.e., total household's expenditure divided by the number of adults gives as :

$$(3.3) \quad Z_i = \frac{Y_i}{N_i}$$

Where Z_i is consumption expenditure per adult equivalent of household i , Y_i refers total household expenditure, N_i number of adults per household (Mohamednur, 2007; Nega, 2008).

3.4.2 Poverty Line

The preferable method to estimate the poverty line is CBN and the approach that incorporates is Ravallion and Biding (1994). Accordingly, we identify the poorest 50% of the sample population as a reference group with the assumption that in Maichew town the poorest part of society is above 50 % . The food consumption behavior of the reference group accesses to determine average quantities in per adult equivalent of basic food items that makeup the reference food basket. In this case, the basket makes up of the mean consumption levels (purchase, remittance, from aid, and own production) of 23 food items. The calorie value of each food items constructs from WHO of the food nutrition table. The total calorie obtains from consumption of this basket of average quantity per adult by an individual is:

$$(3.4) \quad \sum q_i Kcal_i = T^* \cdot \text{with } T \cong T^* \cdot \text{But } T^* \neq T$$

Where T^* = total calorie obtains by individual adult from consuming of the average quantities.

q_i = average quantity per adult of food item 'i' consumes by individual

$Kcal_i$ = the caloric value of the respective food item 'i' consumes by individual adult

T = recommended calorie of per day per adult (in this case, 2200 kcalorie)

The average quantity per adult of each food item scales up and down by a constant value $\left(\frac{T}{T^*}\right)$ so as to provide total of 2,200kcalorie per adult per day before doing any activities. Then, multiply each food items after scaling up and dawn by the median price and sum up to get a food poverty line .The subsequent step is to estimate the non-food component of the total poverty line. The non-food share of total expenditure estimates through regressing the food share (si) of each

household ‘i’ on a constant and the log of the ratio of total consumption expenditure to the food poverty line (Z^f): Accordingly,

$$(3.5) S_i = \alpha + \beta \log\left(\frac{Y_i}{Z^f}\right) + \varepsilon_i$$

Where S_i denotes the share of food items from the total household’s expenditure, Y_i refers household’s total consumption expenditure, Z^f is the food poverty line, β regression coefficient, α typifies intercept of the food share when $Z^f = Y_i$, and ε_i refers error term. Household spends all of its expenditure on food baskets with equal amount of the food poverty line i.e., consumption expenditure ($Z^f = Y_i$) the food share is equal to the amount of the constant value (α), and consequently the non-food share of the reference group becomes $(1 - \alpha)$, i.e.,

$$(3.6) Z^{nf} = Z^f (1 - \alpha)$$

Where Z^f = food poverty line

Z^{nf} = non food poverty line

The deprived people makes an expenditure on food items only and nothing left for purchasing of non food items. Thus, the total poverty line of the population for the study area gives as:

$$(3.7) Z^t = Z^f (2 - \alpha)$$

3.4.3 Decomposing the Poor

Welfare information (i.e., consumption expenditure in per adult equivalent) and poverty line for the sampled households are available, analyzing the level of poverty and scrutiny the characteristics and variables associated with it becomes very important (ADB, 2004; Baker and Schuler, 2004; World Bank, 2005; Notten and Neubourg, 2007). A widely use group of poverty measures is the Foster Greer, Thorbecke (1984), class of decomposing poverty measure reflects the percentage of poor people as well as the depth and severity of poverty experience down to the poverty line (see Foster et al, 1984), i. e., who are unable to get enough basic local diet of 2,200k.calories per day per adult. This method satisfies the fundamental axiomatic requirements of poverty indices (i.e., focus, monothonicity, transfer sensitivity, invariance and decompose) (World Bank, 2005). The Foster- Greer-Thorbecke (1984) class of poverty measure illustrates as:

$$(3.8) \quad P(C, Z_i, \alpha) = \frac{1}{N} \sum_{h=1}^n \left[\frac{(Z_i - C_h)}{Z_i} \right]^\alpha$$

Where Z_i is the poverty line, C_h is the welfare indicator for household h in per adult consumption expenditure, N is the total sample size, and n is the total sum takes only on poor households ordered from bottom to poverty line. P equals to the share of the population which is poor. The poverty aversion parameter (α) reflects the concern attaches to the proportionate shortfall from the poverty line. If $\alpha = 0$ then, the FGT measure in corresponds to the head count index in which no concern for the depth of the shortfall is shown. If $\alpha = 1$ then, P is equal to the mean distance that separates the poor household from the poverty line, in other words the depth of poverty. And if $\alpha = 2$ P is a measure sensitive to the inequality among the poor.

3.5 Econometric Specification

3.5.1 The Consumption Model

The main objective of this sub section is to specify an estimable model in the direction of identifying determinants of poverty i.e., change in the household welfare measures in log per adult equivalent. One basic determinant of household welfare is human capital which in turn intensifies by the social transition of household head. Investigating the human capital (social transition) priority to estimate household welfare becomes a sound issue.

Khoury (2001); Gallagher (1999), find that highest share of urban poverty is vastly interconnected with poor social transition of the society. Social transition in a sense social movement of the household especial the household head that goes upward(climbers), moves down ward(skidders),or horizontal movement(stayers) in period of time(at least for the last five-ten years) in selective household's socio- economic indicators with in the social structure. According to Khoury (2001), major factors that affect social transition of the household head are housing condition, education status of household head, employment level of household head , income change of household head, birth place of household head and likes. From this argument,

social characteristics of household head influences welfare of that household (Jackson, 2005). Examining the social transition of Maichew residents attracts an attention to address which variable considers as path finder for decreases, remaining the same or increases in household's head social transition. The probability of down ward movement (skidders), constant move (stayres) and upward move (climbers) in social transition gives multinomial logistic distribution and leads to the use multinomial logit model of analysis .

$$(3.9) \quad y^* = X\beta' + \varepsilon_i$$

Where y^* is the latent dependent variable i.e., the probability of household's head social transition decreases, remaining the same or increases. β' refers vector of regression coefficient , X equals to vector of explanatory variables differ across individual household heads i.e., housing condition dummy equal to 1 owns a house and dummy equal to 0 which don't own; level of education of household head splits into two, improves (increasing years of education change) and not improve (zero years of education change) . Income level of household head considers improves with dummy equal to 1 and otherwise 0, birth place of household head with dummy 1 other town or area, otherwise Maichew,0 ε_i deals with error term with zero mean and constant variance. In practice y^* (the probability of deteriorating, remaining the same or increasing in social transition) is un observable, what we observe is a variable y_i and explained by using multinomial logit model.

$$(3.10) \quad \begin{aligned} y^* &= -1 \quad \text{if } y_i \leq 0, \text{ probability of deteriorating in social transition.} \\ &= 0 \quad \text{if } 0 < y_i \leq \alpha_1, \text{ probability of remaining in social transition.} \\ &= 1 \quad \text{if } y_i > \alpha_1, \text{ probability of increases in social transition.} \end{aligned}$$

Given the standard normal distribution for ε_i , it is straightforward to derive the conditional distribution of y given X_i and simply, compute each response probability. In this case, the respective probability of the multinomial logit distribution of the social transition of individual household head becomes:

$$(3.11) \quad P(y^* = -1/X_i) = P(y^* \leq 0/X_i) = P(X\beta + \varepsilon \leq \alpha_1/X_i) = \Phi(-X\beta)$$

$$(3.12) \quad P(y^* = 0/X_i) = P(\alpha_1 < y^* \leq \alpha_2/X) = \Phi(\alpha_1 - X'\beta) - \Phi(-X'\beta)$$

$$(3.13) \quad P(y^* = \gamma_{X_i}) = P(y^* > \alpha_2/\gamma_{X_i}) = 1 - \Phi(\alpha_1 - X' \beta)$$

The above probability functions enter to the log maximum likelihood estimation model and expresses as:

(3.14)

$$L(\alpha, \beta) = [y_i = -1] \log \Phi(-X' \beta) + [y_i = 0] \log \Phi(\alpha_1 - X' \beta) - \Phi(-X' \beta) + [y_i = 1] \log [1 - \Phi(\alpha_1 - X' \beta)]$$

To find the value of the response probability of households' head to which category they fall i.e., deteriorating, remaining the same or improves in the context of social transition, the multinomial logit (MNL) model has response probabilities which describes as follow:

$$(3.15) \quad P(y_i = j/\gamma_{X_i}) = \frac{\exp(X_j \beta_j)}{\left[1 + \sum_{h=-1}^j \exp(X \beta_h)\right]}, \quad j = -1, 0, \text{ and } 1$$

There are three possible outcomes of probabilities and the respective value estimates as;

$$(3.16) \quad P(y_i = 0/\gamma_{X_i}) = \frac{\exp(X \beta_0)}{\left[1 + \sum_{h=-1}^j \exp(X \beta_h)\right]} = \frac{1}{\left[1 + \sum_{h=-1}^j \exp(X \beta_h)\right]},$$

$$(3.17) \quad P(y_i = -1/\gamma_{X_i}) = \frac{\exp(X \beta_{-1})}{\left[1 + \sum_{h=0}^1 \exp(X \beta_h)\right]},$$

$$(3.18) \quad P(y_i = 1/\gamma_{X_i}) = \frac{\exp(X_1 \beta_1)}{\left[1 + \sum_{h=-1}^0 \exp(X \beta_h)\right]},$$

The sum of the three responses probabilistic should be equal to unity.

$$(3.19) \quad \frac{1}{\left[1 + \sum_{h=-1}^j \exp(X \beta_h)\right]} + \frac{\exp(X_{-1} \beta_{-1})}{\left[1 + \sum_{h=0}^1 \exp(X \beta_h)\right]} + \frac{\exp(X_1 \beta_1)}{\left[1 + \sum_{h=-1}^0 \exp(X \beta_h)\right]} = 1$$

The one with more observation probability category considers as the base line outcome and the remaining out comes are estimated and interpreted in reference to the base out come (Wooldridge, 2002).and this illustrates as:

$$(3.20) \quad \ln\left(\frac{P(y=i)}{P(y=k)}\right) = \alpha + \exp(X_i\beta_i)$$

Where $P(y=k)$, the base(reference)response probability, $P(y=i)$, the required probability, α = the intercept of the multinomial functional expression.

The estimation of maximum likelihood method of the multinomial logit model gives only the sign effect of the explanatory variables up on the probability of the social transition of household head. The calculated value of response probability of each category confers the status of the household head pertaining to its social transition and considers as an explanatory variable in (equation 3.21) in human capital vector. To identify the determinants of the welfare of household in the study area, we apply a typical regression equation of semi log- linear regression function:

$$(3.21) \quad \text{Log}(C_i) = \alpha + \beta'H_i + \delta P_i + \sigma D_i, \dots, + \gamma' X + \varepsilon_i$$

Where C_i welfare indicator (response variable) refers consumption expenditure per adult equivalent of household 'i', H is a vector of human capital variables of household head 'i' P is the vector of physical capital variables of household 'i', D is vector of demographic composition of household 'i' " α is household's fixed effect that unobserved household heterogeneity, β' , σ and δ are vector of regression coefficients and ε_i the disturbance term which accounts for the unexplained part of the model. Method of estimation is OLS (Assefa, 2003; Green, 2003; Verbeek, 2004).

3.5.2 The Probability of being Poor

To characterize the total poor in the study area, we deploy a probability model so as to forecast the chance of dawning to the poverty line(Bogale and Kolf,2009).Given dependent variable of main interest that household classifies as poor or non poor, a binary probit model is appropriate for the analysis .

$$(3.22) \quad y^* = X'\beta + \varepsilon_i$$

Where y^* is unobservable magnitude that considers the net probability to individual of poor , X is vector of individual household characteristics, β is vector of parameters and ε_i the disturbance term. The out come of the response variable expresses as:

$$y_i = 1 \text{ if } y^* \leq 0, \text{ the poor and} \\ y_i = 0, \text{ if } y^* > 0 \text{ non poor}$$

Following (Green 2003), and

$$(3.23) \quad P(y_i = 1 / X_i) = \frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)}$$

For any vector β the probability of observing y conditional on X_i in a likelihood function expresses as follow:

$$(3.24) \quad L(\beta / X_i) = \prod_{i=1}^n P_r(y_i = 0 / X_i \beta)^{1-y_i} * P_r(y_i = 1 / X_i \beta)^{y_i}$$

The over all probability of observing a sample is simply the product of the individual probabilities (being poor and non poor households) and estimated by transferring into log likelihood function.

$$(3.25) \quad \ln L(\beta / X_i) = \sum_{i=1}^n (1 - y_i) * \ln P_r(y_i = 0 / X_i \beta) + y_i \ln P_r(y_i = 1 / X_i \beta)$$

Coefficient of the above result shows only the sign effect of the variables on the probability of poor or non poor. Then, the marginal effect of a particular independent variables X_i on the probability of the occurrence of the response depicts as follow (Green, 2003; Verbeek, 2004).

$$(3.26) \quad \frac{\partial P(y = 1)}{\partial X} = \frac{\exp(X_i \beta)}{1 + \exp(X_i \beta)} * \beta$$

Unlike to OLS in which the marginal effects are constant, in the case of probit model, we calculate them at different levels of the explanatory variables to get an idea of the range of variation of the resulting changes in the probability.

3.6 Determinants of Poverty Indices and Vulnerability to poverty

3.6.1 Determinants of Poverty indices

One important point take cares in the measurement of household's welfare in Maichew town is determinant of poverty indices i.e., factors that affect poverty gap and poverty severity. In order to model the poverty gap and poverty severity, following Appleton (1995), we use a censored Tobit model. The measure of household poverty, P_i , gives:

$$(3.27) \quad P_i = \left[\frac{Z_i - C_i}{Z} \right]^\alpha$$

If $C_i < Z$, poorness is sever
= 0, otherwise

Where α is equal to 0, 1, and 2, P_i refers to headcount, poverty gap and poverty severity of the household respectively, Z = poverty line and C_i = consumption expenditure of household in per adult equivalent. Then, modeling this would be equivalent to model a censored dependent variable, C_i^* , equals to the consumption of the poor but fixes at the poverty line for the non-poor. That is to say,

$$(3.28) \quad C_i^* = X_i \beta + \varepsilon_i$$

Where C_i^* is consumption expenditure of household i , X_i is vector of determinant of welfare including household and community characteristics, and β is vector of parameters. Therefore, under these model variations in consumption above the poverty line don't include in the analysis. In this formulation, the consumption of the poor is determined with the error term assumed to be normally distributed and variance δ^2 . And the estimates of poverty function are obtained by maximizing the log likelihood function of the above model (see Madalla, 1999).

3.6.2 Vulnerability to Poverty

The story of poverty measurement and analysis never stops here. Although they are distinct concepts, many economists argue that there is an alignment between poverty and vulnerability to poverty for two reputable facts: (i) the poor typically exposes to diverse risks, and (ii) the poor has the smallest instruments to deal with these risks. By broadening the span of poverty assessment to take account of vulnerability to poverty, the thoughtfulness draws on cross-sectional household survey to grant a detail profile of the poor, and to document the incidence of poverty in various segments of the population. The reason behind consolidates the concept of vulnerability to poverty is that today's poor may or may not be tomorrow's poor and currently non-poor households, who faces a high probability of adverse shock may experience the shock and become poor tomorrow (Azam and Imai , 2009; Kruijk and Rutten, 2007/08; Chaudhuri, 2003; Dang et al, 2009; Makoka and Marcus, 2005; Barrientos, 2007; Dacron, 2005).

The principal aim of forward looking vulnerability to poverty estimation is to have an estimate of household's over time mean and variance of consumption expenditures in per adult equivalent. Even though panel data is required to come across vulnerability to poverty, overtime comparability of poverty estimates in developing country is difficult for the following cases. (i) changes in methodology of data collection and poverty estimation over time, (ii) panel data is not available in developing countries in most cases; and (iii) most data aren't design to provide a full account of impact of shocks. In this study, we use the vulnerability to poverty measure proposed by Chaudhuri (2003); Chaudhuri et al (2002); Suryahadi and Sumarto (2003) for cross-section data. According to Chaudhuri (2003), for a given household h , the vulnerability to poverty defines as the probability of household's per adult consumption expenditure being below poverty line at time $t+1$:

$$(3.29) \quad V_{ht} = P_r(\ln C_{h,t+1} < \ln \underline{C})$$

Where V_{ht} is vulnerability of household h at time t , $C_{h,t+1}$ denotes the per adult consumption expenditure of household h at time $t+1$ and $\ln \underline{C}$ stands for the poverty line . For household h the data generation process for consumption captures in the following equation:

$$(3.30) \quad \ln C = X' \beta + \varepsilon_i$$

Where $\ln C$ stands for per adult consumption expenditure for household h , X represents a vector of observable household characteristics (containing both individual and community factors), β is a vector of parameters, and ε_i is a mean-zero disturbance term. Per adult consumption expenditures, in natural logarithmic and the disturbance term, ε_i distributes normally and the vulnerability to poverty of household, h with characteristics X_h calculates using the coefficient estimate of equation (3.30) in the following manner:

$$(3.31) \quad \hat{V}_h = \hat{P}_r \left(\ln C_h < \ln \underline{C} / X_h \right) = \Phi \left[\frac{\ln \underline{C} - X_h \hat{\beta}}{\hat{\sigma}} \right]$$

\hat{V}_h denotes vulnerability to poverty, which is the probability of per adult consumption level of each household ($\ln C_h$) lower than the poverty line ($\ln \underline{C}$) conditional on household characteristics X_h . Meanwhile, Φ denotes the cumulative density of the standard normal distribution and $\hat{\sigma}$ is the standard error of the equation (3.30). It is obvious that household's future consumption depends upon uncertainty about some individual and community characteristics. To have consistent estimate of parameters, it is necessary to entertain with the concept of heteroskedasticity, that is, variances of the disturbance term varies across time as the explanatory variables vary. In view of that, the variance of error term states as:

$$(3.32) \quad \sigma^2_{e,h} = X_h \theta + \eta_h = \sum \sum_{j>i} X_{ih} X_{hj} \theta_{ij} + \eta_h$$

A three-stage Feasible Generalized Least Squares (3FGLS) procedure becomes applicable to estimate the parameter θ . To that end, first, equation (3.30) estimates using an ordinary least squares (OLS) procedure. Then, the estimated square residual ($\hat{e}^2_{OLS,h}$) of equation (3.30) uses as a dependent variable and apply to estimate the equation (3.32), again using OLS: After estimation, the predictions value obtained from this equation also use to transform the equation as follow:

$$(3.33) \quad \frac{\hat{e}^2_{OLS,h}}{X_h \hat{\theta}_{OLS}} = \left[\frac{X_h}{X_h \hat{\theta}_{OLS}} \right] \theta + \frac{\eta_h}{X_h \hat{\theta}_{OLS}}$$

Where $X_h \hat{\theta}_{OLS} = e^2_{e,h}$, the variance of the error term

This transformed equation estimates using OLS to obtain an asymptotically efficient FGLS estimate, $\hat{\theta}_{FGLS}$. $X_h \hat{\theta}_{FGLS}$ is $\sigma^2_{e,h}$ which is the variance of the individual component of household consumption per adult and this further uses to transform equation (3.30) into:

$$(3.34) \quad \frac{\ln C_h}{\sqrt{X_h \hat{\theta}_{FGLS}}} = \left[\frac{X_h}{\sqrt{X_h \hat{\theta}_{FGLS}}} \right] \beta + \frac{e_h}{\sqrt{X_h \hat{\theta}_{FGLS}}}$$

Where $\ln C_h$ denotes household's per adult consumption expenditure, X_h refers to household characteristics, β represents vector of regression coefficient, and e_h stands for standard error ($\sqrt{X_h \hat{\theta}_{FGLS}} = \hat{e}_{e,h}$) the estimated standard error. OLS estimation of equation (3.34) yields consistent and asymptotically efficient estimate of β . The standard error of the estimated coefficient $\hat{\beta}_{FGLS}$ is obtained by dividing the reported standard error (e_h) by the standard error of the regression ($\sqrt{X_h \hat{\theta}_{FGLS}} = \hat{e}_{e,h}$). Finally, the estimates of β and θ obtain through 3FGLS method use to estimate the vulnerability to poverty of each household in the town through the following generalization equation (See for detail about this issue Azam and Imai, 2009; Dang et al, 2009).

$$(3.35) \quad V^*_h = \Phi \left(\frac{\ln \underline{C} - X_h \hat{\beta}}{\sqrt{\sum_i \sum_{j>i} X_h^i X_h^j \hat{\theta}_{ij}}} \right)$$

The above expression clearly represents the estimation of vulnerability to poverty via the following independent elements i.e., the distributional assumption of normality of log consumption in per adult equivalent, the choice of poverty line $\ln \underline{C}$, the expected level of log

consumption expenditure in adult equivalent and the expected variability of log consumption. Therefore, the expected log consumption per adult equivalent of each household explains as;

$$(3.36) \quad \widehat{E}(\ln C/X_h) = X_h \widehat{\beta}$$

And the variance of log consumption per adult equivalent of each household h gives as:

$$(3.37) \quad \widehat{V}(\ln C_h/X_h) = e^2_{e,h} = X_h \widehat{\theta}$$

The higher the level of expected consumption and expected consumption variability, the lower is the vulnerability of household to poverty. The plus point of this vulnerability measure is that it estimates with cross section data. On the other hand, the minus side is the impact of aggregate or inter-temporal shocks are missing (i.e., the distribution of consumption across household and management of distribution instruments). Similar to the household welfare analysis i.e., household consumption expenditure in per adult equivalent equation (3.21), it is evident from the literature as well as from the empirical studies that vulnerability is also affected by variables which are highly pretentious to wellbeing on a number of counts. Thus, the model below(3.38) applies to examine the determinants of vulnerability to poverty of each household in the study area.

$$(3.38) \quad V_h = X' \Psi + \mu_i$$

Where \widehat{V}_h is the estimated vulnerability of each household from equation (3.35), X_h is the vector of household individual plus community characteristics capture from household survey, Ψ is vector of coefficients, μ is the error term and apply OLS.

3.7 Inequality and Poverty

The main focus of this sub topic is to look at the situation of individual households who find themselves at the bottom and top of the consumption distribution. To visualize and compare in consumption inequality in the study area we use the Lorenz curve analysis and defines as:

$$(3.39) \quad L(P) = \frac{\int_0^P Q(q) dq}{\int_0^1 Q(q) dq} = \frac{1}{\mu} \int_0^P Q(q) dq$$

Where $\int_0^P Q(q) dq$ sums the consumption expenditure of the bottom p proportion

$\int_0^1 Q(q) dq$ sums the consumption expenditure of all the entire sample

population in per adult (Araar,2006).

$L(p)$ indicates the cumulative percentage of total expenditure holds by a cumulative proportion P of the population, if a proportion $P = 0$, the population necessarily holds a proportion of 0% of expenditure (perfect equality among the groups), and if a proportion $p = 1$, the population holds 100% of aggregate consumption(perfect inequality among the groups). If all sampled households have the same expenditure on food and non food, the cumulative percentage of total consumption holds by any bottom proportion P of the population in the town becomes P . Then, Lorenz curve exhibits $L(p) = P$ and population share and share of total consumption expenditure are identical. Therefore, the distance between zero inequality line and the Lorenz curve becomes, $P - L(P)$. The larger the " deficit", the larger the inequality of welfare among the inhabitants of the town. By aggregating that deficit between sample population share and consumption expenditure share across all values of P between 0 and 1, we get half the well-known Gini index of inequality and estimate the magnitude on welfare inequality of the society with the help of DAD version 4.5 (2006) soft ware.

$$(3.40) \quad \frac{\text{Gini index inequality}}{2} = \int_0^1 (P - L(P)) dp$$

In most economies, the top fifth quintiles population accounts for a sizeable share of total expenditure. In a sample of heterogeneous individuals we expect propensity to forward looking to differ across individuals and the best way to identify these differences is by looking at the dynamic behavior of the individual household consumption paths. Hence, identifying the determinant factors which bring a difference in the consumption behavior of the society in the

study area becomes paramount important. The decomposition of welfare inequality depends on the consumption expenditure variation function that expresses as (Fields 2002):

$$(3.41) \quad \ln Y_{it} = a_t Z_{it}$$

Where $\ln Y_{it}$ is the consumption expenditure function,

a_t is coefficient of explanatory variables i.e., $[\alpha_t \beta_{1t} \beta_{2t} \beta_{3t} \dots \beta_{jt} 1]$

Z'_{it} determinants of welfare inequality $[1 X_{i1t}, X_{i2t}, X_{i3t} \dots X_{ijt} \varepsilon_{it} X_{i1t}]$

Having good estimates for the coefficients on the variables (i.e., in OLS estimation), the next step deals with the decomposition of the log-variance of the dependent variable. Take the variance of both sides of (3.41), the left hand side of the equation measures the inequality of log variance (consumption expenditure) and the variance of the right hand side further manipulates (theorem Mood, Graybill, and Boes). Assuming there are two sets of random variables (A_1, \dots, A_p and B_1, \dots, B_q) and two sets of corresponding constants (a_1, \dots, a_p and b_1, \dots, b_q). Then

$$(3.42) \quad \text{cov} \left[\sum_{p=1}^p a_p A_p, \sum_{q=1}^q b_q B_q \right] = \sum_{p=1}^p \sum_{q=1}^q a_p b_q \text{cov}[A_p B_q]$$

Applying this theorem in the context of a single random variable $\ln Y$ such that

$\ln Y = \sum_j^{J+2} a_j Z_j$, we have

$$(3.43) \quad \text{cov} \left[\sum_{j=1}^{J+2} a_j Z_j, \ln Y \right] = \sum_{j=1}^{J+2} \text{cov}[a_j Z_j, \ln Y]$$

But the left hand side of (3.43) is the covariance between $\ln Y$ and it self, it is simply the variance of the dependent variable $\ln Y$ and expresses as follow:

$$(3.44) \quad \sigma^2(\ln Y) = \sum_{j=1}^{J+2} \text{cov}[a_j Z_j, \ln Y]$$

In order to get each variable's contribution in carry of welfare inequality, divide equation (3.44) by $\sigma^2(\ln Y)$ and we have

$$(3.45) \quad 100\% = \frac{\sum_{j=1}^{J+2} \text{cov}[a_j Z_j, \ln Y]}{\sigma^2(\ln Y)} = \sum_{j=1}^{J+2} S_j(\ln Y)$$

Where each $s_i(\ln Y)$ is a so-called "relative factor inequality weight" which gives as

$$(3.46) \quad s_j(\ln Y) = \frac{\text{cov}[a_j Z_j, \ln Y]}{\sigma^2(\ln Y)}$$

Then, the log-variance of consumption decomposes as follow

$$(3.47) \quad s_i(\ln Y) = \frac{\text{cov}[a_j Z_j, \ln Y]}{\sigma^2(\ln Y)} = \frac{a_j * \sigma(Z_j) * \text{cor}[Z_i, \ln Y]}{\sigma(\ln Y)}$$

Where $s_i(\ln Y)$ = relative factor inequality weight

a_j = coefficient of explanatory factor j in OLS estimation

$\sigma(Z_j)$ = standard deviation of the explanatory factor Z_i

$\sigma(\ln Y)$ = standard deviation of the log consumption expenditure

$\sigma^2(\ln Y)$ = variance of log consumption expenditure

The correlation between explanatory variable and log consumption expenditure i.e., $\text{cor}[Z_i, \ln Y]$ also further expresses as (See Fields, 2002 for the proof).

$$(3.48) \quad \text{cor}[Z_j, \ln Y] = \frac{\text{cov}[Z_j, \ln Y]}{\sigma(Z_j) * \sigma(\ln Y)}$$

Finally, (equation 3.47) becomes

$$(3.49) \quad s_i(\ln Y) = a_j * \text{cov}[Z_i, \ln Y] \text{ then, apply OLS.}$$

IV. RESULTS AND DISCUSSIONS

This chapter portrays the empirical findings of the poverty assessment survey and confers their connotation. Both descriptive and multivariate regression analyses are executed. In the descriptive analysis, an overview of the household and community characteristics towards the existing welfare status of households in the town and their profile are thoroughly conversed. In addition to this, the demographic and socio-economic features supposed to have an influence on the welfare of the sample unit (household) are also addressed.

In the multivariate regression analysis, factors that have an effect on households' welfare (consumption expenditure per adult), vulnerability to poverty and other welfare indicators using econometric tools are pointed out. Furthermore, the social transition of household head, poverty indices via FGT poverty measure, along with variables affecting the poor and other concerns coupled with the measurement and analysis of poverty and vulnerability to poverty of the sampled population indulgence in the subject oriented manner.

4.1 Descriptive Analysis of the Survey data

The survey involves a total of 210 sample households (40 households from kebele one, 60 households from kebele two, 50 households from kebele three and 60 households from kebele four). Out of this total sample, only 205 households use for the analysis and the remaining five households remove due to coding error by enumerators during data collection. Respondents are either the head (if female headed) or the spouse for male headed households or family member

who is much closer and well familiar with household expenditure management. The 2007 population survey for Maichew town publicizes that the total population of the town is 23,484 with 2.6% estimated annual population growth (CSA, 2007). Population density of the study area is 3,575 persons per km²(BoFED,2007). The kebele-inhabitant distribution shows kebele two and four are densely populous while kebele one is the least dense of all.

Out of the total respondents, 131 (63.90%) are male headed households and the rest 74 (36.10%) are female headed households. The average family size of the sample households is 4.73 and ranges from 1 (five households) to 14(one household). Majority of households have five members in their family. Data about the household head age shows that the average age is 48.1 years and it stretches from 19 to 90 years. The level of education of household head assort from no education (illiterate) to higher education graduates. Of all the household heads consider in the sample, information about the major occupation of the household heads discloses that 23 (11.21%) engage in farming, 53(25.85%) in informal and formal trading activities also known as petty trade, 56(27.31%) are civil servant, 16 (7.8%) are daily laborer, 13 (6.34%) are pensioners, and 12(5.85%) households engage in handcraft activities. The remaining share of the job taxonomy accounts by begging, police and unemployed house wives. The following table 4.1 typifies service facilities received by households like access to safe water, electricity, telephone and sanitation.

Table 4.1: Households access to services

| Type of service facility | Number and percentage of HHs with access to service | |
|------------------------------|---|------------|
| | number | percentage |
| Own water pipe line | 129 | 63 |
| Electricity service | 181 | 88 |
| Sanitation Service | 150 | 73 |
| Telephone service (landline) | 83 | 40 |
| Residential house | 153 | 75 |

Source: Compute from own Survey, 2009.

Table 4.1 indicates that 37 % of the sample households do not own private water pipe line and oblige to use other sources for daily consumption at high opportunity cost. Concerning to other services like electricity, sanitation and owning landline telephone, 24 (12%) never receive electricity as a source of light and 55(27%) of the respondents don't have any sanitation mechanism. Moreover, 122(60%) of the household respondents don't have a telephone line. Residential housing condition of the respondents indicates that 52(25%) live on either rented houses or relatives houses with poor quality. Hence, lack of adequate shelter, unsafe water, unsuitable sanitary facility and scarce residential housing in general characterize poverty in the study area. According to the survey, 39.21 % of households have at least one unproductive person in the family (age less than 15 and above 64 years) which extends from 0 to 6 per household and out of the total respondents 41(20%) of the household heads are unproductive (above 64 years). As a result, the mean size of dependence ratio is 0.7 which means that one productive person supports on average 0.7 unproductive persons.

The marital status of the respondents shows that 116(56.58%) of respondents are married, 19(9.27%) divorced, 56(27.32%) widowed either husband or wife is dead and 14(6.83%) are separated. From the total female headed households i.e., 74(36.10%) of the sample households, widowed female headed households account 45(60.81%), divorced female headed households are 21 (28.37%), and separated female headed households are 8(10.81%). Among the three categories of female headed households, Poor living status observes more among the divorced female headed households.

The survey questionnaire includes about orphans in a household. Results indicate that, 28(13.66%) of the households have at least one orphan in their family. Female headed households have less family size as compared to their male headed counterparts. This might be due to the fact that the chance of remarrying for a widow is much lower than a widower. Income is one of the welfare indicators. Unequal distribution of income at one time shows the disparity of living standard of the society and its distribution demonstrates what is happening to poverty in time. The average monthly income of the sample household is Birr 972 arraying from a minimum of Birr 40 to a maximum of Birr 7000 per month. Out of this, the mean monthly income of the

female headed households is Birr 743 and male headed household is Birr 1105. From the sample households, 134(65.37%) have a mean monthly income of less than Birr 800. The positive outlier of income of some households is due to remittances from relatives living outside Ethiopia. One characteristic of the sample respondents reveals by high food expenditure i.e.,67% of households' expenditure channels for food consumption which is the highest in the region (WFP et al, 2008/9). As compared to the mean monthly income i.e., Birr 972, households spend Birr 1153 on food and Birr 530 on non food items on average during the survey time. Though household's spending ultimately derives from income, in the data the mean monthly expenditure outshines the mean monthly income. This might be due to underreporting of respondent's income, and smoothing of consumption either by borrowing or dissaving at a time of income shock.

In order to assess the ability of households to cope up current and future shocks, we ask households whether they have saving habit or not to review the aptitude of households in consumption smoothing. Accordingly, the survey result shows that only 90(43.9%) of the respondents exhibit saving. One attribute of urban dwellers is that they are cash dependent and those with low capability of getting cash i.e., the unproductive people always expect assistant from the government. Having this, 21(10.24%) of the household respondents receive food aid from the administration although the handout is not consistently given every month.

Households depend on petty trading and small business account 35.12 %(72 households) of the total respondents. The opening of the new Alamata –Mohoni -Hiwane road affects negatively the business climate in Maichew. This forces many petty and small operators to close their shops and move to other places. On the other hand, 63(30.73%), of household's source of income radiates from constant monthly salary of civil servants and suffers greatly from the ever-increasing product's price. Crop production, remittance, pension, begging and other means take the remaining share of households' source of income. Although it requires further detail investigation how far the opening of the new Alamata - Mehoni–Hiwane road affects pessimistically to the growth momentum of the town of Maichew and its people, 189(92.19%) of the respondents realize that one way or the other, the road diversion makes a gloomy future to the growth of the town as well as to its inhabitants. Due to this, current private investment impetus in the town is some how passive.

Data for households' wealth and assets proxy by whether households own residential house, durables goods, and other productive assets or not shows that, 182 (88.78%) households have a mean wealth and asset indices of 0.49 and 0.14 respectively. Other findings of the survey concerning the living condition of the society indicate that, 100(48.78%) of the households led a stagnant or deteriorating living condition during the last three years and 147(71.70%) of respondents practice reduction of food consumption as compared to September 2008 given survey time is September 2009. There are many reasons for reducing of food consumption such as; not having enough income, more family members, bad agricultural harvesting, inconsistent government in kind transfer, but 162 (79.02%) of respondent's reply is due to unexpected price rise of food items.

On other hand,167(81.46%) of the respondents face on average two times shortage of money to purchase food items in the last six months given survey time is September 2009. For the purpose of consumption smoothing 41(20%), of the households borrow money from different financial schemes, out of which 23(56.09%) are unable to pay their debt. Male headed households have on average high food consumption pattern (i.e., Birr 1233) as compare to female headed (i.e., Birr 1020) and this implies that food poverty in Maichew town is more common among female headed households. The following table 4.2 uses for the above descriptive and successive regression analysis.

Table 4.2: Summary of Descriptive Statistics of the Survey (partial)

| Variable | Obs | Mean | Std. Dev | Min | Max |
|---|-----|---------|----------|--------|----------|
| Food expenditure at market price | 205 | 1157.23 | 1152.6 | 59 | 12,125 |
| Non food expenditure at market price | 205 | 532 | 651.84 | 30 | 6520 |
| Total expenditure at market price | 205 | 1689.28 | 1607.76 | 161 | 13,55.83 |
| food share | 205 | 0.69 | 0.10 | 0.35 | 0.95 |
| Per capita consumption expenditure | 205 | 413.23 | 49.23 | 573.92 | 6577.92 |
| Adult consumption expenditure at market price | 205 | 484.63 | 0.03 | 55.95 | 7308.79 |
| Family size | 205 | 4.73 | 2.02 | 1. | 14 |
| Children less than ~7yrs | 205 | 0.51 | .71 | 0 | 4 |
| Children b/n 7~14yrs | 205 | 1.00 | 1.07 | 0 | 6 |
| Adult b/n 15~64yrs | 205 | 3.01 | 1.61 | 0 | 8 |
| Elders above 64yrs | 205 | 0.27 | 0.67 | 0 | 5 |
| Adult equivalent size | 205 | 3.99 | 1.75 | 0.74 | 12.44 |
| Wealth index | 205 | 0.49 | 0.41 | 0.13 | 0.91 |
| Asset index | 205 | 0.13 | 0.12 | 0.03 | 0.85 |
| Dependence ratio | 205 | 0.71 | 0.88 | 0 | 6 |
| Head age | 205 | 48.08 | 14.67 | 19 | 90 |
| head female, yes =1, 0 otherwise | 205 | 0.39 | 0.72 | 0 | 1 |
| Head educ(years of education) | 205 | 6.69 | 6.25 | 0 | 16 |
| Head farmer(dummy yes, = 1,0 otherwise) | 24 | 0.95 | 0.20 | 0 | 1 |
| Head petty trade(dummy yes=1, 0 otherwise) | 53 | 1 | 0 | 0 | 1 |
| Head daily worker(dummy yes =1, 0 otherwise) | 16 | 1 | 0 | 0 | 1 |
| Head housewife(dummy yes = 1, 0 otherwise) | 7 | 1 | 0 | 0 | 1 |
| Head student(dummy yes = 1, 0 otherwise) | 2 | 1 | 0 | 0 | 1 |
| Head handcraft(dummy yes 1, 0 otherwise) | 12 | 1 | 0 | 0 | 1 |
| Head pension(yes=1, 0 otherwise) | 12 | 1 | 0 | 0 | 1 |
| Head police(dummy yes= 1, 0 otherwise) | 2 | 1 | 0 | 0 | 1 |
| Head bagger(dummy yes=1, 0 otherwise) | 1 | - | 0 | 0 | 1 |
| Head married(dummy yes=1, 0 otherwise) | 116 | 1 | 0 | 0 | 1 |
| Head divorced(dummy yes= 1, 0 otherwise) | 19 | 1 | 0 | 0 | 1 |
| Head widowed(dummy yes= 1, 0 otherwise) | 56 | 1 | 0 | 0 | 1 |
| Head single(dummy yes =1,0 otherwise) | 4 | 1 | 0 | 0 | 1 |
| Head Tigray(dummy yes =1, 0 otherwise) | 200 | 0.97 | 0.15 | 0 | 1 |

| Variable | Obs | Mean | Std. Dev | Min | Max |
|--|-----|------|----------|-----|-----|
| Head Amhara(dummy yes =1, 0 otherwise) | 4 | 1 | 1 | 0 | 1 |
| Head Agew(dummy yes = 1, 0 otherwise) | 1 | 1 | - | 0 | 1 |
| Headseparated(dummyyes=1,0 otherwise) | 14 | 1 | 0 | 0 | 1 |
| Head orthodox(dummy yes = 1, 0 otherwise) | 191 | 0.93 | 0.24 | 0 | 1 |
| Head Muslim (dummy yes= 1, 0 otherwise) | 14 | 1 | 0 | 0 | 1 |
| Spouse education(yrs of education) | 106 | 5.57 | 5.98 | 0 | 16 |
| Residential house(dummy, yes =1 own, 0 otherwise) | 205 | 0.76 | 0.43 | 0 | 1 |
| Social transition(dummy deteriorate =-1 , 0, constant, and 1 improved) | 205 | -.15 | 0.99 | -1 | 1 |
| Income change(dummy =1 improved, 0 otherwise) | 205 | 0.48 | 0.50 | 0 | 1 |
| Family living in one room | 205 | 3.51 | 1.05 | 1 | 6 |
| Saving acct(dummy = 1 own, 0 otherwise) | 205 | .44 | .49 | 0 | 1 |

Source: Compute from own survey data, 2009.

4.2 *Empirical Results and Discussions*

4.2.1 *Measuring poverty*

Estimating poverty line facilitates identification of the poor from non poor. The poverty line that uses in this study derives from the household's consumption expenditure for food and non food items. The poverty line sets using the Cost of Basic Needs (CBN) approach. For that end, a basket contains 23 food items which commonly consume by 50% of the bottom poor households identify with great care. We take the monthly average consumption of each food item in adult equivalent and construct the corresponding caloric value (See Annex, table 1). Median price of each food item obtains from internal price data of the survey. Multiply the average quantities in adult equivalent of the food items consume by the individual poor by the corresponding calorie value and let this value Z_i . For the sake of consistence with the average each food items expresses in Kg, Z_i multiplies by 10. Then, scale up and down the average per adult quantities of the food items by a constant number (i.e., the ratio obtains by dividing 66,000 to the sum total of Z_i) and multiply by the corresponding median price and sum up to get the food poverty line per month

(See chapter 3.4.2). To come up with total poverty line, two approaches are practically sound. The first one, dividing the food poverty line by the Engle coefficient (i.e., the ratio of the food expenditure to the total expenditure of household) and the second uses the method adopt by Ravailian and Bidnia(1994). Because of major pitfall of the former, that is, it overlooks the treatment of price, basket of food items and the non food expenditure, we use the second approach. Accordingly, the absolute poverty lines estimated in per adult equivalent at current market price and constant prices (2006 price as a base year price) display on table 4.3 below.

Table 4.3: Poverty line of the study area per month (ETB)

| Poverty line | Values | |
|-----------------|---|-----------------|
| | At constant price (2006 base year price) | At Market price |
| Food poverty | 85 | 187 |
| Nonfood poverty | 66 | 64 |
| Total poverty | 151 | 251 |

Source: Compute from own survey data, 2009.

This market price poverty line reflects the norm, the culture, the taste and preference of the society situate in the study area. Compared to the base year price poverty line, the current market poverty line is higher by approximately, 100 ETB and this is a result of the ever increasing price of food items (See Annex table 2: computation of food poverty line). We check the sensitivity of the current market price poverty line by taking upper and lower values¹.

¹ Take the upper poverty line ETB 261 and the lower one ETB 241. Accordingly, for the upward movement of poverty line by 4%(i.e., ETB 261) head count index increases by 10.7% and poverty gap and poverty severity also elevate by 10% and 9.45% respectively. Similarly for the lower value (i.e., poverty line ETB 241), head count index decreases by 12.67% and poverty gap and poverty severity also decline by 9.5% and 9% respectively. Hence, the poverty line exhibits a sensitive nature to upper and lower values.

After estimating the poverty line of the study area, we characterize the poverty profile of households using the poverty indices to aggregate the information on individual household's welfare. We apply the earliest but perhaps most famous measures of poverty, the Foster, Greer, and Thorbecke, FGT (1984) P_{α} class of poverty indices. We use consumption rather than income to measure welfare profile of household since consumption captures the long-term welfare of individual and better reflects households' ability to meet basic needs than current income.

Table 4.4 presents the poverty indices calculated using food and total poverty lines of ETB 187 and ETB 251 respectively. We use version 4.5 the DAD soft ware for distributive analysis (Araar, 2006). Aligned to total poverty line, absolute head count ratio stands at 0.3170 indicates that on average 31.70% of the sample population in Maichew is unable to meet the stipulated minimum level of caloric intake i.e., 2200 kcal per adult equivalence per day. Loosely speaking, the number of individuals in the sample whose consumption falls below the poverty line account for 31.70% which is lower than the national urban poverty head count of 35.1% (MoFED, 2007).

Although headcount ratio has great virtues in understanding; it lacks information about the intensity of poverty and overlooks telling how the poor are poorer.

Table 4.4 Poverty indices at Maichew town (n=205)

| Poverty index | Food Poverty (MktP) | Stand. error | Total Poverty (MktP) | Stand. error | Confidence limit (%) |
|-------------------------|---------------------|--------------|----------------------|--------------|----------------------|
| Head count(P_0) | 0.3024 | 0.01 | 0.3170 | 0.03 | 95.000 |
| Poverty gap(P_1) | 0.0852 | 0.01 | 0.0894 | 0.01 | 95.000 |
| Poverty Square(P_2) | gap 0.0357 | 0.01 | 0.0375 | 0.01 | 95.000 |

Source: Computed from own survey data, 2009.

Poverty gap measures the mean proportionate gap of the welfare of households in which the non-poor has zero poverty gaps. Table 4.4, shows that the mean difference between the total poverty line and the consumption expenditure of the poor is 8.9%. This implies that to bring the welfare of the poor to the poverty line, at least 8.9% of poverty line should be transferred to the poor.

The Poverty gap square realizes that the severity of poverty and it accounts about 3.75% i.e., weighted sum of poverty gaps (as proportion of the poverty line) which also lower than the national poverty gap square of 3.9%(MoFED, 2007). Coming to food poverty indices, the share of the population whose consumption expenditure below the food poverty line is 30.24% which is 1.46% less than the proportion of people who are under absolute poverty. This implies that food poverty contributes more to aggravate total poverty. The food poverty gap indicates poor households are 8.5% far off from the food poverty line. Severity of food poverty of the sample household also accounts 3.5%.

4.3 Econometric Results and Discussions

In this sub section, we treat results concerning social transition of household heads as well as the socio economic, demographic and other factors that affect the consumption behavior of households. We use multinomial logit model to estimate the probability of a household head's social transition. A multinomial logistic regression simultaneously estimates the K-1 equations using maximum likelihood estimation method and there is no order within the categories of y i.e., deteriorates, improves or remaining the same in social transition of given household's head. Table 4.5 below shows the multinomial regression result given the dependent variable is dummy with value of -1 deteriorating, 0 remaining the same and 1 improves in household head's social transition. The base line outcome is deteriorating in social transition.

Furthermore, table 4.5 indicates that improves income, change in years of education and living in personal house have positive and statistically significant effect on improving the social transition of household head. The probability of improves in social transition of households in

Maichew town is 0.35. Similarly, the value of the probability of the respective out comes is 0.22 for remaining the same social transition, and 0.43 for deteriorating social transition.

Table 4.5: Multinomial logistic regression of Social transition of HHh

| Socialtransision~n: | Independent | | Robust | dy/dx | Z-value | P> z |
|--|------------------------|--------------------------------|-----------|-------|---------|-------|
| Dependent Variable | variables | Coeffici | Std,error | | | |
| Remaining the same | House condition | .026 | .505 | -.19 | 0.05 | 0.95 |
| | Change year of educati | .070 | .217 | -.05 | 0.32 | 0.74 |
| | Income change | 2.13* | .53 | .03 | 4.01 | 0.000 |
| | Birthplace(Maichew) | -.4 | .47 | -.05 | -0.84 | 0.39 |
| | -Constant | -1.61* | .51 | - | -3.15 | 0.00 |
| Improved | House condition | 2.63* | .84 | .59 | 3.13 | 0.00 |
| | Change year of educati | .88* | .19 | .19 | 4.70 | 0.00 |
| | Income change | 3.98* | .63 | .62 | 6.28 | 0.00 |
| | Birthplace(Maichew)) | -.17 | .57 | -.01 | -0.31 | 0.76 |
| | -Constant | -5.33* | 1.06 | - | -5.01 | 0.00 |
| Number of obs = 205 | | Prob > chi2 = 0.0000 | | | | |
| LR chi2 (8) = 208.64 | | Pseudo R ² = 0.5119 | | | | |
| Log likelihood = -99.468015 | | | | | | |
| (Social transition==deteriorate is the base outcome) | | | | | | |

* Significant at 1% level,

Source: Compute from own survey, 2009.

Table 4.5 also illustrates, about the marginal effect of each variable upon the respective social transition. For instance, owning a residential house positively influences improvement in social transition of heads with marginal effect of 0.59 and like wise one Birr increases in income leads to increase the probability of improving social transition by 0.62 .On the other hand, not owning a residential house affects negatively to the social transition and brings to stagnant probability of social transition by 0.19.

4.3. 1 Determinants of Poverty (The Consumption Model)

Multivariate econometric analysis helps us to identify factors influence the extent of poverty. To that end, we exploit OLS and probit models. But before actual estimation takes place, we invest much on the data exploration process. To start with, we convey a simple correlation coefficient matrix in order to test whether multicollinearity is present or not among the explanatory variables. For that matter, we check the existence of multicollinearity and found no sever problem since the correlation matrix results are less than 0.8 and Variation Inflation Factor (VIF) is less than 10 with the exception of the correlation between age and age squared which is high as expected.

Largely in all cases, the statistical significance of the various parameters differs widely across variables and the signs of the estimate variables anticipate with reasonable relative magnitudes. As one can see from the results of the different regression models, some are statistically significant at 1%, 5% and 10% level while others are not significant even at 10% level of significance. For the sake of completeness, the reports of the estimated results in all cases include non-significant variables at 10% level of significance also appear in the analysis.

4.3.1.1 Determinants of Consumption Expenditure (OLS result)

Following the model specification in chapter 3.5.1 equation 3.21, households' welfare function (proxies by household's consumption expenditure function) estimates using ordinary least square model. The result presents in table 4.6. We note that the dependent variable of the model is the natural logarithm of real consumption per adult equivalent, and hence the regression coefficients measure the percentage change in consumption per adult equivalent for a unit changes in the explanatory variable. Owing to the cross sectional nature of our data, problem of heteroskedasticity is likely to prevail which means that as the value of the independent variables vary, the value of error terms also diverge. We sense the presence of heteroskedasticity via the Cook-Weisberg test for heteroskedasticity (estat hettest) and reject the null hypothesis at 5% level of significance. Thus, t- test and F- test turn out to be no more valid (See Annex table 3 for estat hettest). To overcome the problem, we drive alternative estimators by transforming the original

data in to homoskedasticity error terms. The approach we apply is the Generalized Least Square (GLS).

First, we regress the consumption model up on the variables which suspect to create the problem of heteroskedasticity using OLS and find the residual value. Second, squaring the residual and develop auxiliary regression model in which the dependent variable is the residual square and the independent variables are the original model regressors and apply OLS. We obtain the predicted value of the residual square in the second step regression and transform the whole model by dividing the dependent and the independent variables by the predicted value and finally run OLS so as to find unbiased, consistent and efficient estimators. Besides the heteroskedasticity problem, there is also a suspect of problem of endogeneity i.e., a correlation between the explanatory variables and the error term. We test out the existence of endogeneity using Hausman endogeneity test. At 5% significant level, we accept the null hypothesis that there is no endogeneity problem in our data (See Annex 6 endogeneity test). Thus, error terms are identically and independently distributed and regressors are orthogonal to the error term.

We verify the OLS assumption of normality of the error term using non parametrical Kernel density normality test and there is no deviation from the normal distribution density. (See Annex 5 normality test of error term). The P- value assures the tail probability for the two tail test for rejecting of the null hypothesis over the level of significance (i.e., 95% CI by default) of slope coefficients of each variable. The F-value, 11.63, shows that the overall model for the estimates of the OLS regression as a good fit. Further more, the fitness of the model also checks using Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC). Accordingly, at 24 degree of freedom, the fitted model improves up on the null model in explaining the variation of the response variable (see Annex table 9). Retaining the constant term option in the OLS result doesn't affect a loss to the efficiency of the estimated parameters. In the meantime, omitting it becomes senseless if the mean of the response variables is zero and all variable coefficients are insignificant.

Different explanatory variables that explain the demographic characteristics of a household are also incorporate in the regression. According to the results display in table 4.6 below, holding

other variables constant, households with more family members exhibit lower welfare. Everything else constant, adding one additional member to household reduces the welfare of the household by 13.4%. Age square is negatively related to household's welfare at 5% level of significance. This implies that the older the head of household, the lesser is the welfare of that household keeping other variables constant.

Gender of a household head has a positive and significant impact on household welfare. This contradicts to the general expectation; female headed households are poorer than male headed households in urban Ethiopia. In the descriptive analysis (chapter 4.1), it shows that male headed households are more likely to be in a good position of welfare than female headed households. The difference in the result might stem from the fact that in a regression model we control the effect for other variables whereas the descriptive statistics does not, thus, the regression analysis compares male and female headed household with the same characteristics while average FHHs and MHHs do not have the same value for these covariates. Table 4.6, also presents about the welfare level across different job categories of household heads. Accordingly, being petty trade household head keeping other variables constant has positive relationship with welfare and its marginal effect results in increasing welfare of household by 17.4% on average.

Table 4.6. OLS regression result (Modeling the Welfare Function)

| Dependent variable: Log per adult equivalence consumption expenditure | | | | |
|---|-------------------|-----------|---------------------|-------|
| Explanatory variables | Coefficient | Std. Err. | t-value | P> t |
| Head age | .041** | .017 | 2.34 | 0.020 |
| Headage2 | -.001** | .000 | -2.16 | 0.032 |
| Family size | -.134*** | .028 | -4.75 | 0.000 |
| Children less than 7~years | .052 | .058 | 0.90 | 0.369 |
| Children between 7~14years | -.033 | .044 | -0.77 | 0.445 |
| Dependence ratio | .060 | .063 | 0.95 | 0.345 |
| Head female | .401*** | .130 | 3.08 | 0.002 |
| Head education | .035*** | .011 | 3.09 | 0.002 |
| Spouse education | .010 | .007 | 1.28 | 0.203 |
| Head farmer | .082 | .131 | 0.63 | 0.532 |
| Head petty trade | .174* | .101 | 1.73 | 0.086 |
| Head pension | -.182 | .166 | -1.10 | 0.274 |
| Head civil servant | -.124 | .132 | -0.94 | 0.348 |
| Head married | -.132 | .181 | -0.73 | 0.469 |
| Head divorced | -.558*** | .188 | -2.96 | 0.004 |
| Head widowed | -.280* | .165 | -1.70 | 0.091 |
| Saving acct | .013 | .082 | 0.16 | 0.873 |
| Orphans | -.063 | .110 | -.27 | 0.565 |
| Access to credit | -.020 | .075 | -0.27 | 0.787 |
| Housing quality index | 0.565* | .116 | 1.92 | 0.056 |
| Property index | 1.149*** | .236 | 4.86 | 0.000 |
| Service index | .313*** | .120 | 2.61 | 0.005 |
| Head Social transition | -.434** | .187 | -2.32 | 0.022 |
| Constant | 20.33*** | 1.990 | 10.21 | 0.000 |
| Number of obs = 205 | R-squared = .5870 | | F (23, 180) = 11.63 | |

Prob > F = 0.0000

Adj R-squared = .5400

* significant at 10%, **Significant at the 5% level; ***Significant at the 1% level

Source: Compute from own survey, 2009.

Another demographic character that influences household welfare is marital status of the household head. The above table 4.6 discloses that, divorced and widowed household heads have lower level of welfare and the effect is significant at 1 % and 10% respectively. Furthermore, being divorced and widowed household heads, their welfare lowers on average by 55.8% and 28% respectively *citrus paribus*. Physical capital of household represents by property index and

housing quality index are other welfare determinants. From table 4.6, one can infer that housing quality index and property index are positively related with household's welfare. Concerning the marginal effect, increasing in the housing quality index and property index by one, the welfare of that household increases by 56.5% and 114.9 % respectively. Similarly, a household with service equipped residential home which reflects by service index has positive and significant effect on welfare of households at 1% level. On the other hand, human capital variable of the household head mirrors by social transition relates inversely with welfare of household keeping the effect of other variables constant.

4.3.1.2 Determinants of Poverty Incidence (Probit Model)

The probit model helps to identify the determinants to explain the probability that a household is poor given normally distribution of the error term. Based on absolute total poverty line, we look through factors that determine the household's welfare to fall below this poverty line. Even though the slope coefficients of the probit model do not much affect by unequal sample rating, problem of heteroskedasticity inherits in our data. But we adopt the standard robust heteroskedasticity estimation method to over come the problem. Apart from their signs, the coefficients of the probit model results do not interpret straight forward like OLS or LPM; because the functional expression of binary choice model inhibits linear relationship. The only thing that can be seen is positive or negative relationship with the dependent variable (i.e., the probability of becoming poor). Coefficients of variables with negative sign are negatively correlated with the probability of becoming poor and coefficients with positive sign are positively associated with the probability of becoming poor.

Most of the probit results are consistent with OLS results. However, some inconsistencies observe due to the sensitivity of the dependent variable under probit model to the poverty line. Testing individual slope coefficients look like to OLS by looking to the t- value and for the cumulative effect of the estimates of the probit model depends on the generalized likelihood-ratio. In view of that, the chi-square statistics of the Likelihood Ratio (LR), computes as comparing the log likelihood from the full model to the restrictive model shows the overall model as a good fit with LR of 149.94 and typifies at least some of the slope coefficients are

significantly different from zero. In contrast to estimation from welfare function (OLS outcome), probit result shows that female-headship has no significant influence on the poverty incidence of households keeping other variables equal. Age of the household head is significant and has negative relation while age-square facilitates the likelihood of household being poor at 5% level. On the other hand, property and service indices of households dwindle in the likelihood of poverty incidence at 1% level of significance. The marginal effect of property index in reducing the likelihood of falling to the poverty domain is more than other variables. For that end, for increases household's property index by one, probability of becoming poor reduces by 70.3%.

Household size explains by number of people in various disaggregate age groups appears to have positive and significant influence on the incidence of poverty. For an increasing of family size by one person, the possibility of becoming a poor increases by 7.6%. Years of education of household head and spouse significantly trim down the likelihood of the household to fall into poverty. In its marginal effect, for increasing years of education of household head and spouse by one year, the opportunity of joining to poor diminishes by 1.3% and 1.4% respectively. This might be due to the fact that the direct relationship of years of education and earning more income. Similar to the OLS estimation, in the probit model results show that household heads engage in petty trade activities and civil servant employees have lower level probability to fall to poverty. While households headed by pensioners have a high probability of becoming poor.

Regarding the marginal effect, being petty trade and civil servant household heads, the probability of falling to the poor reduces by 9.8% and 12.5 % respectively. However, households headed by a pensioner head increase the chance of falling to the poor marginally by 34%.

Table 4.7: Determinants of Poverty Incident (Probit Result)

:

Dependent variable: (P₀)Probability of being poor

| Explanatory Variables | Coefficient | Robust Std. Err | dF/dx | Z-value | P> Z |
|-----------------------|-------------|-----------------|-------|---------|--------|
| Head age | -.150** | .068 | -.023 | -2.21 | 0.027 |
| Headage2 | .002** | .001 | .0002 | 2.53 | 0.012 |
| Family size | .488*** | .175 | .076 | 2.79 | 0.005 |
| Adult/n 15~64yrs | .091 | .179 | .037 | 0.51 | 0.608 |
| Dependence ratio | .215 | .029 | .029 | 0.99 | 0.321 |
| Head female | .057 | .539 | .004 | 0.11 | 0.916 |
| Head education | -.087** | .044 | -.013 | -1.97 | 0.049 |
| Spouse education | -.108*** | .039 | -.014 | -2.76 | 0.006 |
| Head farmer | -.140 | .382 | .064 | -0.37 | 0.713 |
| Head petty trade | -1.27*** | .409 | -.098 | -3.11 | 0.002 |
| Pension | 1.06* | .557 | .340 | -1.91 | 0.056 |
| Head civil servant | -1.16* | .654 | -.125 | -1.78 | 0.075 |
| Head married | 1.39* | .814 | .135 | 1.72 | 0.086 |
| Head divorced | 1.68** | .730 | .457 | 2.30 | 0.021 |
| Head widowed | .622 | .651 | .138 | 0.96 | 0.339 |
| Saving acct | .581 | .084 | .073 | 1.58 | 0.115 |
| Orphans | .209 | .345 | .016 | 0.61 | 0.544 |
| Access to credit | -.114 | .015 | -.012 | -0.36 | 0.718 |
| Housing quality index | -.433 | .482 | -.038 | -0.90 | 0.369 |
| Property index | -3.67*** | 1.248 | -.703 | -2.94 | 0.003 |
| Service index | -1.34*** | .459 | -.195 | -2.94 | 0.003 |
| Social transition | -2.72 | 1.810 | -.084 | -1.50 | 0.1333 |
| _constant | 2.208 | 1.803 | - | 1.22 | 0.221 |

Number of obs = 205 Prob > chi2 = .0000

LR chi2(22) = 149.94 Pseudo R² = 0.59

Log likelihood = -51.13

*Significant at the 10% level; **Significant at the 5% level; ***Significant at the 1% level

Source: Compute from own survey, 2009.

4.3.1.3 Determinants of Poverty Gap and Poverty Severity (Tobit Model)

Tobit model uses to analyze the determinants of poverty gap i.e., factors that determine the depth of poverty. In a Tobit model the response variable (dependent variable) is no more binary

but has limited range. The sample for Tobit analysis draws from the sub set of the population (i.e., from below poverty line) by excluding samples above poverty line. We loss the response variable (i.e, the values of the dependent variable represented as consumption expenditure in adult equivalent) of non poor category but considers all the explanatory variables in the model. As a result, we address household and individual factors that influence poverty gap through Tobit regression analysis. Coefficient of variables having a negative sign refer that they are inversely related with poverty gap and coefficient of variables with positive sign affect the poverty gap directly.

Tobit model differs from the binary model in that the latent variable is observable (i.e., $y^* \leq$ poverty line). The mean of the error term is not zero but assumes the distribution of U_i transacted normal distribution. Therefore, estimating the probability of influencing the variables to the poverty gap is the main issue of this sub topic. Tobit results interpret in the same way as OLS results. The chi-square statistics of the likelihood ratio shows the overall model as a good fit. Estimation results appear in table 4.8. The result depicts that female headed households and poverty gap are directly related. Households with more family size have a higher probability of falling to poverty gap. With respect to marginal effect for increasing of family size by one member, the probability of falling to poverty gap increases by 11.1%. The married and divorced households are significant and positively link with poverty gap at 10% and 5% level of significance. The possible reason for this might be increasing of family members for the married household headed and shrinking of income from the spouse side for the divorced household headed.

Similarly, age square of household head associates directly with poverty depth holding other variables constant. On the other hand, table 4.8 demonstrates that household head with age greater than 64 years and educated head attach with poverty gap inversely and significantly at 5% level. The marginal effect of household heads' education represents by increases in one year keeping other variables constant lowers the probability of poverty gap by 2.7%. Working status of household head also affects the poverty gap differently. Accordingly, households headed by petty trade and civil servant employee relate inversely with poverty gap at 1% and 5% respectively. Age of household head links inversely with the poverty gap. Households headed by

young have relatively a lower poverty gap than households headed by aged household heads. Likewise households headed by pensioners have a wider poverty gap than households headed by civil servants. The marginal effect shows that household head being a pensioner, holding other factors the same, aggravates the probability of the expected depth of poverty by 27.5%. Residential house equipped with durable property and service might bring the household welfare in good position and inversely related with poverty gap at 1% level of significant.

Table 4. 8: Determinants of Poverty Gap (Tobit Model)

| Dependent variable : (P ₁)Poverty Gap | | | | | |
|---|-------------|-------------------------------|--------------------|---------|-------|
| Explanatory Variables | Coefficient | dy/dx | Robust Std. Err | t-value | P> t |
| Head age | -.088* | -.029 | .036 | -2.44 | 0.082 |
| Headage2 | .001* | .0002 | .0003 | 3.33 | 0.084 |
| Family size | .255*** | .111 | .057 | 4.28 | 0.000 |
| Adult between 15~64yrs | .049 | .018 | .064 | 0.63 | 0.527 |
| Elder above 64years | -.416** | -.191 | .204 | -2.05 | 0.034 |
| Head female | .183 | .076 | .278 | 0.59 | 0.660 |
| Head education | -.052** | -.027 | .023 | -2.47 | 0.011 |
| Spouse education | -.002 | -.022 | .020 | 0.10 | 0.40 |
| Head farmer | .002 | .064 | .216 | 0.01 | 0.990 |
| Head petty trade | -.524*** | -1.049 | .182 | 2.78 | 0.003 |
| Head pension | .618** | .275 | .296 | 2.08 | 0.025 |
| Head civil servant | -.827** | -.064 | .287 | -3.89 | 0.020 |
| Head married | .849* | .321 | .451 | 1.88 | 0.05 |
| Head divorced | .844** | .435 | .392 | 2.07 | 0.022 |
| Head widowed | .417 | .281 | .369 | 0.875 | 0.228 |
| Saving acct | .133 | .085 | .152 | 1.21 | 0.373 |
| Orphans | -.033 | .037 | .196 | 0.13 | 0.866 |
| Access to credit | -.140 | -.072 | .146 | -1.07 | 0.320 |
| Housing quality index | -.217 | .126 | .234 | 1.17 | 0.362 |
| Property index | -1.997*** | -1.261 | .666 | -4.15 | 0.003 |
| Service index | -.625*** | -.172 | .219 | -2.85 | 0.003 |
| Head social transition | -.625 | -.086 | .767 | -0.81 | .904 |
| _constant | 1.326 | - | .908 | 0.14 | 0.100 |
| Number of Obs | 205 | Prob>chi2=0.0000 | | | |
| Log likelihood = | -88.92 | Pseudo R ² =0.4838 | | | |

*Significant at the 10% level; **Significant at the 5% level; ***Significant at the 1% level

Source: Compute from own survey, 2009.

Similar to the determinants of poverty gap, factors that determine the severity of poverty also estimate using the Tobit model. The result depicts in table 4.9. The chi-square statistic of the likelihood ratio shows the overall model is a good fit. Households with more family size and those headed by aged household heads expose to severity of poverty. For that end, adding one person to family member facilities the probability of households exposing to severity of poverty on average by 12%.

Disaggregating headship by job classification suggests that civil servants and those engage in petty trade have lower level of severity of poverty than pensioners at 5% level of significance. Concerning the marginal effect of the job categories, being petty trade or civil servant reduces the probability of poverty severity by 14.2% and 11.1% respectively. Table 4.9 also shows the relationship between severity of poverty and marital status of household heads. Accordingly, a household head being married or divorced has positive and significant relationship with severity of poverty. The possibility of falling to severity of poverty in the above marital status categories might come from increasing of family size in case of married households and decrease of income from the spouse side for the divorced headed households. Being divorced and married head of household, probability of exposing to severity of poverty increases by 36.8% and 46.6% respectively. Similar to the poverty gap analysis, household head and spouse education are negatively interconnected with severity of poverty at 5% and 1% level respectively. The marginal effect of increasing in years of household head and spouse education by one year exhibits a decreasing in the probability of falling to poverty severity by 2.7% and 2.6% respectively.

The relationship between age of household head and severity of poverty is hump-shaped. This implies that households headed by young household heads have lower level of severity of poverty than households headed by aged household heads keeping other variables effect constant.

Table 4 .9: Determinants of Severity of Poverty (Tobit Model)

| Dependent variable :(P ₂) Poverty Severity | | | | | |
|---|--------------|-------------------|-----------------|---------|-------|
| Explanatory Variables | Coefficients | dy/dx | Robust.Std. Err | t-value | P> t |
| Head age | -.124* | -.030 | .069 | -1.78 | 0.07 |
| Head adage2 | .001* | .0002 | .0006 | 1.74 | 0.089 |
| Family size | .493*** | .120 | .109 | 4.49 | 0.000 |
| Adult between 15~64 years | .053 | .012 | .124 | 0.43 | 0.411 |
| Elder above 64 years | -.776** | -.189 | .384 | -2.02 | 0.034 |
| Head female | .294 | .073 | .539 | 0.54 | 0.60 |
| Head education | -.112** | -.027 | .045 | -2.46 | 0.011 |
| Spouse education | -.106*** | -.026 | .040 | -2.62 | 0.002 |
| Head farmer | .102 | .025 | .415 | 0.250 | 0.990 |
| Head petty trade | -.633** | -.142 | .349 | -1.81 | 0.029 |
| Head pension | .894** | .247 | .565 | 1.582 | 0.025 |
| Head civil servant | -.483** | -.111 | .551 | -0.88 | 0.020 |
| Head married | 1.655** | .368 | .872 | 1.90 | 0.022 |
| Head divorced | 1.66** | .466 | .759 | 2.21 | 0.014 |
| Head widowed | 1.20 | .318 | .714 | 1.68 | 0.228 |
| Saving acct | .286 | .070 | .293 | 0.970 | 0.373 |
| Orphans | .124 | .031 | .378 | 0.97 | 0.866 |
| Access to credit | -.322 | -.078 | .281 | -1.15 | 0.320 |
| Housing quality index | .683 | .166 | .452 | 1.51 | 0.362 |
| Property index | -5.066*** | -1.236 | 1.242 | -4.08 | 0.003 |
| Service index | -.794** | -.194 | .423 | -1.88 | 0.023 |
| Head Social transition | -.744 | -.182 | 1.468 | -0.51 | 0.904 |
| constant | 1.795 | - | 1.742 | 1.03 | 0.100 |
| Number of Obs = 205 | | Prob>chi2= 0.0000 | | | |
| Pseudo R ² = 0.389 | | LR= 166.68 | | | |
| Log likelihood = -133.86 | | | | | |

Significant at the 10% level; **Significant at the 5% level; ***Significant at the

Source: Compute from own survey, 2009.

4.4Extent of Vulnerability to Poverty

The objective of the study is to create household's current poverty profile and check out the extent of vulnerability to poverty and there by figuring out course of poverty in Maichew town. Using the model specification in chapter 3.6.2 equation 3.35, we generate an estimate of vulnerability for each household. The result summarizes the mean vulnerability i.e., the

probability a household will be vulnerable. Amongst the vulnerable, we distinguish those whom we term the relatively vulnerable and highly vulnerable. Result indicates that on average 40% of the society in the town is vulnerable (the highest is 89% and lowest 4.1%). This result tells us the probability of falling into poverty in a period a head is 0.40 by implication the head count index point in the next period. In line with Chaudhuri (2003), choosing the focal point to be 0.5 where the household becomes vulnerable to poverty, 31.5% of the sampled households find to be vulnerable to poverty and out of this, 37.3% of the households are female headed. The Predicted value of the expected consumption and the variance of the expected consumption of households in the future bring sound indicator to what extent individual households subject to the vulnerability pipe line. The GLS result indicates that expected log consumption per adult equivalent is positively influence by education level of head and spouse.

Table 4:10. GLS Regression: The expected and variance of log per adult equivalent Consumption expenditure

| Dependent Variables: | $E(\ln C/X)$ | | $Var(\ln C / X)$ | |
|--------------------------|--------------|------------|------------------|------------|
| Explanatory Variables | Coefficient | Std. error | Coefficient | Std. error |
| Head age | 0.619* | .360 | -.826** | .3797 |
| Headage2 | 0.516 | .376 | -.7068* | .4082 |
| Family size | -.538 | .663 | -.4595 | .718 |
| Dependence ratio | -.782 | 3.545 | | |
| Adult equivalent~ | 1.077*** | .396 | | |
| Child between 7-14 years | -.641 | .568 | 1.593 | 1.085 |
| Property index | 1.260*** | .172 | | |
| Head female | 1.050*** | .324 | -1.252*** | .2420 |
| Head education | 1.115*** | .310 | -1.902*** | .2420 |
| Spouse education | 1.276* | .703 | -9.331** | 4.052 |
| Head petty trade | 3.270* | 1.720 | | |
| Head civil servant | .613 | .552 | | |
| Head widowed | .530 | .368 | | |
| Head divorce | .767*** | .279 | | |
| Access to credit | -.243 | 2.422 | | |
| Social transition | 1.118** | .450 | | |
| Constant | 5.156*** | .462 | 4.338*** | .503 |

* Significant at the 10% level; **Significant at the 5% level; ***Significant at the 1% level.

Source: Compute from own survey, 2009.

Following 3FGLS estimation of vulnerability, we find the factors which influence the vulnerability to poverty, via OLS method. Table 4.11 below depicts the result and indicates that except few variables (i.e., access to credit, high food price, number of children age 7-14 years),the remaining variables show a relationship with vulnerability significantly at 1% and 5% level. Coefficients with negative sign indicate that variables stand against vulnerability to poverty and positive coefficients signify the variables have positive correlation with vulnerability and hence drive the households to poverty.

Table 4:11 OLS Regression: Correlates of Vulnerability to Poverty

| Dependent Variable: Vulnerability to poverty(<i>Vu</i>) | | | | |
|---|-------------|-----------|----------------------|-------|
| Explanatory variables | Coefficient | Std Error | t-value | P> t |
| Head age | -.016*** | .002 | -7.42 | 0.000 |
| Headage2 | .0001*** | 9.33 | 13.07 | 0.000 |
| Family size | .027*** | .002 | 9.71 | 0.000 |
| Childless than ~7yrs | -.062*** | .014 | -4.35 | 0.000 |
| Child between 7~14yrs | -.003 | .007 | -0.54 | 0.593 |
| Adult between 15~64yrs | -.034*** | .012 | -2.89 | 0.004 |
| Elder above 64yrs | -.041*** | .011 | -3.49 | 0.001 |
| Head female | -.118*** | .007 | -16.02 | 0.000 |
| Head education | -.013*** | .001 | -21.93 | 0.000 |
| Spouse education | -.003*** | .001 | -7.89 | 0.000 |
| Head petty trade | -.059*** | .005 | -11.19 | 0.000 |
| Head handcraft | .124*** | .020 | 5.97 | 0.000 |
| Head civil servant | .028*** | .007 | 3.96 | 0.000 |
| Head married | .054** | .025 | 2.16 | 0.032 |
| Head widowed | .083*** | .009 | 8.82 | 0.000 |
| Head divorced | .180*** | .010 | 16.75 | 0.000 |
| Orphans | .033*** | .012 | 2.81 | 0.005 |
| Access to credit | .012 | .009 | 1.29 | 0.197 |
| Housing quality index | -.091*** | .006 | -12.00 | 0.000 |
| Property index | -.385*** | .013 | -29.23 | 0.000 |
| Service index | -.125*** | .014 | -8.51 | 0.000 |
| Highyfoodprice | .001 | .011 | 0.17 | 0.923 |
| _Constant | 252.17*** | 7.240 | 34.83 | 0.000 |
| R-squared = 0.9183 Adj R-squared = 0.9062 Prob > F = 0.0000 | | | | |
| Number of obs = 203 | | | F(19, 183) = 453.60 | |

Significant at the 5% level; *Significant at the 1% level

Source: Compute from own survey, 2009.

4.5 *Inequality and poverty*

Measuring inequality is broader than poverty since it focuses on the entire population rather than only on the poor. The simplest way to measure inequality among individual households is by dividing the whole population from the poorest to the richest and show the percentage of consumption expenditure attributed to each quintile of the population.

Table 4.12 Summary of adult consumption expenditure in each quintile

| Quintile group | Mean | Std. Dev. | % of mean expenditure | Freq |
|-----------------|------|-----------|-----------------------|------|
| First quintile | 156 | 32.22 | 6.37 | 41 |
| Second quintile | 253 | 24.11 | 10.33 | 41 |
| Third quintile | 341 | 29.26 | 13.93 | 41 |
| Forth quintile | 489 | 61.55 | 19.98 | 41 |
| Fifth quintile | 1209 | 1174.07 | 49.39 | 41 |
| Total | 2448 | 638.77 | 100.00 | 205 |

Source: Compute from own survey, 2009.

From table 4.12, one can infer that the poorest quintile (i.e., the poorest 20%) consumes only 6.37% of the mean expenditures per month per adult, while the share of the richest quintile (i.e., the richest 20%) is 49.39%. Furthermore, the mean expenditure of the first three quintiles (i.e., the poorest 60%) is 30.63% still smaller than the share of the richest 20%. This distribution indicates there is a gap in welfare among the population. The most widely use single measure of inequality is the Gini coefficient. Based on the Lorenz curve, a cumulative frequency curve compares the distribution of consumption expenditure among the inhabitants. The Gini coefficient ranges between 0 perfect equality to 1 perfect inequality. We estimate the Gini coefficient using DAD distributive analysis soft ware (2006) and the value is 0.49. This result indicates that welfare inequality of the society is consistent with the developing countries income

or consumption inequality which is between 0.4 to 0.65(World Bank, 2005). Inequality assessment among the different quintile groups assures that the welfare difference of the population is with the general fact in developing countries.

Though Gini coefficient is not entirely satisfactory, it satisfies the criteria which makes a good measure of welfare inequality, like mean independence, population size independent and symmetry. One may also analyze the nature and causes of change in inequality of welfare over the entire society. To determine for a given probability τ of the sample data set of the corresponding value y of the population and to show whether inequality changes by the independent variables or not, we adopt the method develop by Fields (2002) to decompose the log variance of consumption expenditure. First estimate determinants of consumption expenditure using OLS and the result displays in column two of table 4.13. Most variables entered with expected signs and are significant. Family size, square age of household head, divorced household head and social transition of household head have negative effect on welfare while household head education level, property and service indices affect positively and significantly to log consumption expenditure.

Table 4.13 Contribution of explanatory factors to log consumption expenditure inequality

| Explanatory Variables | OLS Coefficients | Factor inequality weight |
|----------------------------|---------------------|-----------------------------|
| Head age | .041** | 0.033 |
| Headgae2 | -.001** | -0.0001 |
| Family size | -.134*** | 0.018 |
| Children less than 7~years | .052 | |
| Children between 7~14years | -.033 | |
| Dependence ratio | .060 | |
| Head female | .401*** | 0.059 |
| Head education | .035*** | 0.032 |
| Spouse education | .010 | |
| Head petty trade | .174* | 0.029 |
| Head farmer | .082 | |
| Head pension | -.182 | |
| Head civil servant | -.124 | |
| Head married | -.132 | |
| Head divorced | -.558*** | -.083 |
| Head widowed | -.280* | -.028 |
| Saving acct | .013 | |
| Orphans | -.063 | |
| Access to credit | -.020 | |
| Housing quality index | 0.565* | .032 |
| Property Index | 1.149*** | 0.146 |
| Service index | .313*** | 0.049 |
| Head Social transition | -.434** | 0.124 |
| Residual | - | 0.59 |

* Significant at 10% ** significant at 5% *** significant at 1%

Source: Computed from own survey, 2009

Using the coefficients of OLS method we decompose the welfare inequality to its determinants. Next to the residual, the factor with the greatest contribution for welfare inequality is property index. Difference in ownership of durable property explains 14.6% of the difference in average consumption expenditure. Social transition is the next strongest determinant of inequality which accounts 12.4% of the variation in average consumption. Differences level of household head education contributes to inequality only 3%. Housing quality and service indices are other important factors shaping the structure of consumption inequality in Maichew. Age of household head has a concave shape relationship with inequality. At the early age, inequality

increases with increasing age but at later age inequality decreases though the magnitude is negligible.

V. CONCLUSION AND POLICY IMPLICATION

This paper epitomizes the characteristics of society in Maichew town associates with poverty in two steps. The first step builds a poverty profile through descriptive analysis of both household and individual characteristics. The second step deals with a regression analysis that aims to distinguish the role of different individual and societal factors in household poverty level, vulnerability to poverty and inequality. The regression analysis undertakes at the household level. We prefer the consumption approach to income approach in measuring and analyzing the extent of poverty because many individuals may not report their actual income as doing so might reduce their eligibility for cash and in-kind transfers and the volatility nature of income misleads to capture the actual poverty figure. We take care data mining process by using the test parameters for the existence of multicollinearity, endogeneity, heteroskedasticity, and normality and make necessary adjustments.

5.1 Limitations

This study deals with poverty information of households at a point in time. This is because of lack of panel data need for poverty dynamics analysis. Availability of data over a long-term will help to show changes in welfare level of households. Having this, the study exhibits the following limitations.

First, the status of poverty through consumption expenditure of households measures and analyzes using one wave of survey data i.e., September 2009. It becomes unlikely to identify the kind of poverty persistent in the area actually using a single survey. In addition, the survey time is new year in Ethiopia and we suspect that the consumption expenditure of some households might

be high results from a high flow of remittance from relatives out side Ethiopia for the new year celebration and rest above the poverty line.

Second, welfare measurement of households in the study confines only to consumption approach. Other dimensions of welfare measurements don't consider due to difficulties of capturing reliable household information.

Third, the study limits to one town of the southern zone of Tigray Regional State. Almost the urban areas in the southern Tigray are not yet well studied and this paper is limits to Miachew town only.

Fourth, the answer for research question two i.e., poor people or poor area is doesn't support by data from the survey rather exploring of literature due to requirement of multidisciplinary and sufficient time.

5.2 Conclusions

Using the descriptive statistics of the data set both the individual and community parameters of the respondents are exhaustively executed. Accordingly, male headed households are more than their counter female headed households in the marital status of household heads and male headed households have high level of consumption character. The major activities of the household heads are dominated by civil servant and petty trading. Service facilities access to households almost quarter of the population (i.e.,25%) they don't own residential house and 11.70% live without electricity as a source of light. The heart of poverty analysis lays on the estimation of poverty line as it facilitates in identifying the poor from non poor. Using the CBN approach, the area absolute total poverty line is ETB 251 per month per adult and this breaks down further to food poverty line Birr 187 and non food poverty line Birr 64 at current market price. Accordingly, the head count accounts 31.70%, poverty gap 8.94% and poverty severity 3.75%. Food poverty contributes more to the total poverty which is quite consistent in developing countries.

Results of the multinomial logit of the social transition indicate that the probability of deteriorating in households' head social transition is 0.43, remaining the same is 0.22, and improves in social transition is 0.35. We use OLS and binary choice model i.e., probit for analysis of determinants of household's welfare (consumption expenditure) against a series of independent variables. Except few exceptions probit model results are consistent to OLS. Family size, age square of household head, orphans size, pensioner household head significantly lead to decline the welfare of households. On the contrary, petty trade household heads, increases years of education of household head and spouse, households with more property index, equipped housing service, are positively correlated with welfare.

We also investigate determinants of poverty gap and poverty severity given the dependent variable is no more binary but continuous with limited range. Sample draws from the sub set of the population by excluding households whose consumption expenditure per adult is above poverty line and we loss only the dependent variable. The method of estimation is Tobit and results depict that being female headed household shows positive relationship to the poverty gap and poverty severity at 5% level of significance.

Another important point addresses by this study is the extent of vulnerability to poverty at societal level. Using three stages FGLS method we estimate the mean vulnerability to poverty of the society and the result depicts that the degree of vulnerability to poverty on average is 40% which is a head count next period. In line with Chaudri (2003), choosing the focal point to be 0.5, where the household becomes vulnerable to poverty, 31.5% of sample households find vulnerable to poverty. GLS result shows expected log consumption expenditure per adult is positively influence by education level of head, education level of spouse, aggregate property and household quality indices. Along with the estimation of expected consumption and variance of expected log consumption, we diagnose factors influence vulnerability to poverty using OLS method. Results indicate that family size, household with large orphans, households headed by civil servants and those mainly engaged in handcraft are vulnerable. On the other hand, at different age composition of family size, educated household head and spouse, housing quality index influence inversely to vulnerability to poverty.

Welfare inequality observes in the survey since the data reveal that there is great variation in consumption expenditure of the households which ranges from Birr 56 to Birr 7035 per adult equivalent. The poorest 20 % of the population has mean monthly consumption expenditure of Birr 156 where as the mean monthly consumption expenditure of the richest 20% is Birr 1208. For that end, we estimate Gini coefficient and the result found to be 0.49 which is consistent with income or wealth inequality of developing countries. Decomposing welfare inequality on its determinants depicts about the factor contribution using regression based decomposing method. Next to residual, physical capital (property index) and human capital (head social transition) take the greater share in creating welfare inequality by 14.6% and 12.4% respectively.

5.3 Policy Implication

Good poverty reduction plan has to be based on a comprehensive poverty analysis that identifies the nature and evolution of poverty, the profile of poor people, and all contributing factors of poverty. Building on an accurate understanding of poverty, the strategy for poverty reduction has to prioritize the poverty reduction goals and take into account complementarities and compatibilities of various policy tools and modalities. Of course, there is no simple, universal blueprint for implementing this strategy i.e., increasing exits from and decreasing entries into poverty, but based on the empirical findings, we draw the following policy implications to fight poverty at household level.

First, supporting the informal sector: in all estimating parameters test so far, petty trade households are in a good position and they have a potential to resist and combat the lane that leads to poverty in all directions. Therefore, supporting informal enterprises that typically operate on a small scale, with little capital and using family members as workers becomes a sound intervention. Besides access to capital, improvement in the investment climate in which the sector operates especially in contract enforcement and creating market demand for their products by the public institutions are sound areas of intervention.

Second, enhancing urban agricultural productivity and employment: the fact that urban agriculture is labor intensive, it contributes considerably to urban poverty reduction. Availability of good climate condition for diary activities in the area (i.e., Beefing, milk products), poultry, bee, adequate ground water supply to support irrigation especially to grow fruits and vegetables. Therefore, exerting much effort on this sector will play a great role in reducing of unemployment.

Third, encourage public and social safety net: at the moment, public-sector safety net is rare in practice at town level. Probably more than other income groups, the absolute poor will benefit from such intervention. The competitiveness and individualistic nature of urban societies tend to erode traditional values of solidarity and mutual aid. It is therefore important to promote and strengthen community-based social safety nets in the absence of public-sector safety nets.

Fourth, while macroeconomic policies have an impact on reduction of urban poverty, problems face to the town is mostly local in nature. Local efforts to reduce poverty can better match the specific needs and priorities of the poor. Thus, local government is a key actor in society's poverty reduction and should strength its effort much better to the developmental projects to create a multiplier effect to the poor. With the existing fiscal financial arrangement which greater share is allocated to recurrent activities, local governments will find it hard to be effective in urban management and urban poverty reduction. Then, develop an endogenous means of anti-poverty campaign through public mobilization.

Fifth, improving productive capacity: entrepreneurial capacity of the owner of small and medium scale manufacturing enterprises in the town is too low. Primarily, their investment trend concentrates on few and traditional style business activities with no value added to the town. This is the result of lack of know how where and how to make profitable investment. Secondly, the administrative should have great commitment to attract new investors from other areas and stimulate the existing few firms to make good thing on their money. Surprisingly, for the last 18 years the only town in Tigray where trade and investment promotion (Bazaar or exhibition) does 'not take place even ones is Maichew. This is due to passive administrative performance in

communication, organization and poor entrepreneurial capacity of individuals in making such development endeavors. Road diversion from Alamata –Betemera-Mekelle to Alamata -Mohoni-Mekelle by it self has worsened the already poor business climate of the town. Therefore, good cooperation in business development and management should be established to build the capacity of entrepreneurs in all economic sectors in the town.

Sixth, Conditional Cash Transfer(CCT) programs with group-targeting a constant amount of money on the “pro-poor growth”: effect of transfer of a constant amount of income to every one poor of the town couldn’t be promising in reducing of poverty since limited resources will be diluted and no more uniform value added will create on the society. Then, a Birr invests on the absolute poor with special emphasis on women, disability and marginalized minorities brings greater positive effect on reduction of poverty than on the better poor and the non poor. Hence, greatest government priority should be targeting on the absolute poor and put constant money will be a proven track and is one way of reducing aggregate poverty at individual level.

A wide alternative of issues ranging from social transition to determinants of household’s welfare and inequality raise and discuss in different chapters in this research. However, a lot remains to be done in this area for future research. Thus, we suggest the following:

- Most of the works on welfare focus on measuring and identifying the correlates of poverty and inequality. Much effort should be exerted to diagnose the root causes of poverty.
- The study area is designates as “growth corridor” region wise. But the society is in abject poverty and vulnerable to poverty. Thus, further multidisciplinary analysis is demanding so as to verify where the problem lays.
- The study exploits one time survey and no one be able to address the kind of poverty prevalence in the area. Additional household survey becomes crucial to make a consistent welfare assessment.

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MEKELLE UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ECONOMICS
QUESTIONNAIRE FOR HOUSEHOLD SURVEY
CONSUMPTION BASE MEASURES AND ANALYSIS OF URBAN POVERTY THE
CASE OF MAICHEW, SOUTHERN TIGRAY.

Kebelle _____

House Number _____

Interviewee Name _____

Date of Interview _____

Enumerator Name _____

Checked date _____

Comment by Supervisor _____

INTRODUCTION TO THE RESPONDENT:

This survey is being undertaken by a student of Mekelle University College of Business and Economics in the Department of Economics as a partial fulfillment for the award of MSc in Economics. A sample of household is taken from Maichew town to study the socio-economic situation of the society. So your view could be used as important input in attempting to improve the welfare of the society. The interview will take a few minutes and the answer will be completely confidential and strictly for academic purpose only. Your name will never be associated with your answers. Therefore, honest discussion is the best way a head and I am requesting your keen participation in this study.

Questionnaire Code _____

A. BASIC HOUSEHOLD DEMOGRAPHIC INFORMATION

This is the list of all members of the households

| s.No | Name of Family member | Membership type code(a) | SexM =1,Female =0Male | Age | Educational | Marital Status Code(b) | Ethnicity Code(c) | Religion code(d) | Main activities code(e) |
|------|-----------------------|-------------------------|-----------------------|-----|-------------|------------------------|-------------------|------------------|-------------------------|
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| 11 | | | | | | | | | |

Key for Codes: a, b, c, d, e, see below

| Code a | Code b | Code c | Code d | Code e |
|---------------------------------|---------------|-----------|-------------------|----------------|
| Head = 1 | Married= 1 | Tigray= 1 | Orthodox= 1 | Farmer =1 |
| Spouse=2 | Divorced= 2 | Amhara= 2 | Muslim= 2 | Petty trade= 2 |
| Son/Daughter to head & spouse=3 | Widowed=3 | Oromo= 3 | Catholic= 3 | Daily labor=3 |
| Father/mother of head spouse=4 | Separated=4 | Afar =4 | Protestant= 4 | House wife =4 |
| Relatives = 5 | Single= 5 | Agew= 5 | Other Christian=5 | Student= 5 |
| | Too young = 6 | Other = 6 | No religion = 6 | Hand craft=6 |
| | | | | |

| | | | | |
|--|--|--|--|----------------------------------|
| | | | | Pension= 7 |
| | | | | Paid Administrative Work=8 |
| | | | | Policy/Solider = 9 |
| | | | | Beggar =10 |
| | | | | Other =11 |

B. SOCIAL TRANSITION(MOBILITY) INDICATORS

B₁. How do you live now or at present (Residential home Condition)?

1. Own house
2. Rented house
3. Relative's (family) house
4. Other (please describe) _____

B₂ . How did you live for the last five years (Residential home)?

1. Own house
2. Rented house
3. Relative's house
4. Other (please describe) _____

B₃. How did you live for the last ten years (Residential home)?

1. Own house
2. Rented house
3. Relative's house
4. Other (please describe) _____

B₄. If your answer for B₁ is rented (2) house for residential, what is the monthly payment including light and water service? _____

B₅. If your answer for B₁ is owned (1) house what could be the expected monthly payment if rented including lighting and water service? _____

B₆. What was your educational level five years ago (household head)

1. Illiterate
2. Primary school
3. Secondary school
4. Technical and Vocational (TVET)
5. Diploma
6. First degree and above
7. Religion education

B₇. What was your educational level ten years ago? (Household head)

- | | |
|-----------------------|-----------------------------|
| 1. Illiterate | 2. Primary school |
| 3. Secondary school | 4. Technical and Vocational |
| 5. Diploma | 6. First degree and above |
| 7. Religion education | |

B₈. Numbers of person living in one room

- | | | |
|--------|--------------|-------------------|
| 1. Two | 2. Two –four | 3. More than four |
|--------|--------------|-------------------|

C. VULNERABILITY INDICATORS

C₁. Did you sell of your household asset in the last six months?

- | | |
|--------|-------|
| 1. Yes | 2. No |
|--------|-------|

C₂. If your answer is yes for C₁, is Yes, what could be the possible cases?

1. For consumption smoothing
2. School fees and uniforms etc
3. Medical expenses
4. Social expenses
5. Pay for debts
6. For relative assistance
7. Other expenses, please specify _____

C₃. Do you or any body in your household has a saving account?

- | | |
|--------|-------|
| 1. Yes | 2. No |
|--------|-------|

C₄. Estimate the amount of your household Total monthly income from all sources

_____ Birr

C₅. Did your HH or any member of your HH borrow money in the last month (Meskerem, 2002 E.C)?

- | | |
|--------|-------|
| 1. Yes | 2. No |
|--------|-------|

C₆. If your answer for C₅ is Yes, the reason for borrowing the money?

1. To purchase food

2. To buy agricultural inputs like Ox, seed, fertilizer etc.
3. To purchase rent land
4. For medical expense
5. For Education expenses
6. For relative support
7. For trading

C₇. Have you paid back the borrowed money?

1. Yes
2. No

C₈. Compared to September 2008/09 (last year), have your HH's Cereal amount consumed reduced?

1. Yes
2. No

C₉. If your answer for C₉ is yes, what could be the possible reasons?

1. Not enough income/ not good harvesting
2. More HHs member
3. Preferred cereals available in the market
4. Cereals become expensive (unexpected price rise)
5. Less HH members
6. Other please specify _____

C₁₀. During the last six months, how many times you face shortage of money to purchase food or to cover other essential expenditures?

1. One
2. Two
3. More than three

C₁₁. Has your HH experienced any difficulties or shocks in the last six months?

A. Loss or reduced employment of HHs member due to BPR?

1. Yes
2. No

B. Reduce income of HHs members

1. Yes
2. No

C. Serious illness or accidents of HH members

1. Yes
2. No

D. Unusually high food price

1. Yes
2. No

E. Unusually high transport cost

1. Yes 2. No

F. Theft of productive resources

1. Yes 2.No

C₁₂. Did the shock/ difficulty problem (C₁₂) create a decrease or a loss of income/ consumption in cash / kind?

1. Yes 2. No

C₁₃. Is there any extended family (relative) living in your HHs while they are orphans(Dekitams)?

1. Yes 2. No

C₁₄. If your answer for C₁₄ is Yes, how many of them?

1. Only one 2. Two 3. Above two

C₁₅. Has your household been affected by the following?

A. Death of member of household (head of household head/earner)

1. Yes 2. No

B. Abandonment/ forever leaving/ by head of household or divorce

1. Yes 2.No

C. Death of member of household (other than head of household/earner)

1. Yes 2. No

D. Loss of livestock (domestic animal) due to reasons specific to the household

1. Yes 2. No

E. Judicial (legal related) problem

1. Yes 2. No

F. Fire in household, field or property

1. Yes 2. No

G. Loss of crop due to reasons specific to the household

1. Yes 2. No

C₁₆. Has the occurrence of these situations represented (C₁₆) a decrease or loss of income normally received by your household? _____

1. Yes 2. No

C₁₇ Job opportunity created by private investors in the town is

1. Very high 2. Moderate 3. Low 4. Very low

C₁₈. Does your HH has a credit access from DECSI (MARET)?

1. Yes 2. No

C₁₉ .If your answer for the C₂₀ is No, what is the reason why you didn't have?

1. Problems of repayment 3. Problem of group loan
2. Interest rate is high 4. Problem of collateral (Tihiga)
5. No interest/demand for loan 6.Other: _____

C₂₁. Does the main road (Alamata-Betmera) diverted to Mehoni- Hiwane affected the growth of the town?

1. Yes 2.No

C₂₂. If your answer to C₂₂ is Yes, to what extent the living condition of the society is affected due to road diversion to Mohin-Hiwane?

1. Very high 2. Moderately 3. Low 4. Very low

C₂₃.Have your household member visited to health service (clinic or hospital) during the last six months?

1. Yes 2. No

C₂₄. If your answer for D₂₄ is Yes, how many times visited the clinic or hospital?

1. Only one time
2. Two times
3. More than two times

C₂₅. Are you currently in debt for house rent payment?

1. Yes 2. No

C₂₆. Is there a communicable disease that seriously affects the society?

1. Yes 2.No

C₂₇. Where is your birth place?

1. The town (Maichew) 2.Other 3. Rural

D. SOCIO-ECONOMIC INDICATORS

D₁. Source of Water supply for household consumption

1. Own water pipe line
2. Common tap water
3. Fetching from river, stream
4. Purchase from the neighbor
5. Borehole, water pond

D₂. Did your family received Aid for Food and others items from the Administration?

1. Yes
- 2.No

D₃. If your answer fro D₂ is Yes, please list the items you received

In cash _____ Birr

In kind (list the items with their amount) _____

D₄. Service equipped to your household (service parameter)

1. Electricity
2. Sanitation
3. Water
- 4.Cooking fuel
5. Combinations of the above

D₅. What happened to your household's living condition for the last three years?

1. Big improvement
2. Small Improvement
3. Remained the same (No change)
4. Worsening (going from good to bad)

D₆. How do you see your household income change over the last three years?

1. Decreased
2. Increased
3. Unchanged

D₇. In which of the following financial activities (scheme) are you participated more?

1. "Ekub"
2. "Arata "
3. "Maret" (DECSI)
4. 1 and 3
5. None

D₈. How do you find it in solving your household's problems if you are beneficiary of the financial schemes?

1. Very good
2. Good
3. Nothing contributes
4. Not that much

D₉. Do you receive assistance from the community?

1. Very often
2. Occasional
3. Rarely
4. Never

D₁₀. Do you have a telephone connection (land line phone)?

1. Yes
2. No

D₁₁. Does your household own any additional residential or industrial land?

1. Yes _____ M² 2. No

D₁₂. What type of toilet facility do you have?

1. Flush shared with other household 2. Flush private household
3. Pit communal 3. None- Bush

E. HOUSE HOLDEXPENDITURE AND CONSUMPTION

A. FOOD CONSUMPTION AND EXPENDITURE

We would like to ask you about all the food that was bought for consumption and/or was consumed from your own stock, in last month (September 2009).. Please do not include food bought for resale, even after processing (the sum from the different sources should be equal to the total amount consumed).

A. Cereals

| | 1 Food type consumed | 2 Code | 3 Total food consumed in month of September 2002E.C | | 4 Consumed from purchased | | 5 Consumed From production | | 6 Consumed From Gift or aid | |
|--|----------------------------|-----------|---|-----------------|---------------------------------|-----------------|----------------------------------|-----------------|-----------------------------------|-----------------|
| | | | Amount {KG!/she mber | Value {Birr} | Amount [KG!/she mber | Value {Birr} | Amount t {KG/sh ember! | Value {Birr! | Amount {KG}/she mber | value [Birr! |
| | Barely(Sigem) | CR01 | | | | | | | | |
| | Teff | CR02 | | | | | | | | |
| | Wheat(Tsaeda Sinday) | CR03 | | | | | | | | |
| | Red wheat(“Wefiche”) | CR04 | | | | | | | | |
| | Maize | CR05 | | | | | | | | |
| | Sorgom/ Leqhu | CR06 | | | | | | | | |
| | Ots (Ares) | CR07 | | | | | | | | |
| | Rice (Rezu) | CR08 | | | | | | | | |
| | Millet(Dagusha) | CR09 | | | | | | | | |
| | Sub Total | | | | | | | | | |

B. Puls and Oilseeds

| | 1 Food item Consumed | 2 Code | 3 Total food consumed in month of September 2002 E.C | | 4 Consumed from purchased | | 5 Consumed From production | | 6 Consumed From gift or aid | |
|--|--------------------------------|--------|--|--------|---------------------------|--------|----------------------------|--------|-----------------------------|--------|
| | | | Amount | Value | Amount | Value | Amount | Value | Amount | Value |
| | | | {KG!/she mber | {Birr! | [KG!/s hember | {Birr} | {KG!/she mber! | {Birr! | {KG!/she mber | [Birr! |
| | Beans(Gotate) | PL01 | | | | | | | | |
| | Chick peas(shimbra) | PL02 | | | | | | | | |
| | Lents (Brishine) | PL03 | | | | | | | | |
| | Apolit Lents (kiki birshine)) | PL04 | | | | | | | | |
| | Flux(Entatae) | PL05 | | | | | | | | |
| | Haricot beans(Bleque(Adengor) | PL06 | | | | | | | | |
| | Fenugreek(Abish) | PL07 | | | | | | | | |
| | Dekeko | PL08 | | | | | | | | |
| | Others | PL09 | | | | | | | | |
| | Sub Total | | | | | | | | | |

C. Vegetables

| | Food items consumed | Code | Total food consumed in month of September 2002 E.C | | Consumed from purchased | | Consumed From own harvest | | Consumed from gift or aid | |
|--|---------------------------|------|--|--------|-------------------------|--------|---------------------------|--------|---------------------------|--------|
| | | | Amount | Value | Amount | value | Amount | value | Amount | Value |
| | | | [KG] | [Birr] | [KG] | [Birr] | [KG] | [Birr] | [KG] | [Birr] |
| | Onion(keih Shinkurit) | VG01 | | | | | | | | |
| | Tomato(komidero) | VG02 | | | | | | | | |
| | Potatos(dinsh) | VG03 | | | | | | | | |
| | Tsiklili gomen | VG04 | XXXXXX | | | | | | | |
| | Salad(Selata) | VG05 | XXXXXX | | | | | | | |
| | Garlic (Tsaeda Shinkurti) | VG06 | | | | | | | | |
| | Hamel | VG07 | XXXXXX | | | | | | | |
| | Key Sir | VG08 | XXXXXX | | | | | | | |
| | Carrot | VG09 | XXXXXX | | | | | | | |

| Food items consumed | Code | Total food consumed in month of September 2002 E.C | | Consumed from purchased | | Consumed From own harvest | | Consumed from gift or aid | |
|---------------------|-------|--|--------------|-------------------------|--------------|---------------------------|--------------|---------------------------|--------------|
| | | Amount [KG] | Value [Birr] | Amount [KG] | value [Birr] | Amount [KG] | value [Birr] | Amount [KG] | Value [Birr] |
| Pumpkin(Duba) | VG010 | | | | | | | | |
| Others | VG011 | | | | | | | | |
| Sub Total | | | | | | | | | |

D. Fruits

| Food items consumed | Code | Total food consumed in month of September 2002 E.C | | Consumed From purchased | | Consumed From own harvest | | Consumed from gift or aid | |
|---------------------|-------|--|--------------|-------------------------|--------------|---------------------------|--------------|---------------------------|--------------|
| | | Amount [KG] | Value [Birr] | Amount [KG] | value [Birr] | Amount [KG] | value [Birr] | Amount [KG] | Value [Birr] |
| Avocado | FR05 | | | | | | | | |
| Orange | | | | | | | | | |
| Banana | | | | | | | | | |
| Mango | FR06 | | | | | | | | |
| Lomon | FR07 | XXXXXX | | | | | | | |
| Tiringo | FR08 | XXXXXX | | | | | | | |
| Giba | FR09 | | | | | | | | |
| Sugar cane | FR010 | XXXXXX | | | | | | | |
| Others | FR011 | | | | | | | | |
| Sub Total | | | | | | | | | |

E. Food Spices

| Food item Consumed | 2. Code | 3 Total food consumed in month of September 2002 E.C | | 4 Consumed from purchased | | 5 Consumed From Own harvest | | 6 Consumed from gift or aid | |
|--------------------|---------|--|--------------|---------------------------|--------------|-----------------------------|--------------|-----------------------------|--------------|
| | | Amount [KG] | Value [Birr] | Amount [KG] | Value [Birr] | Amount [KG] | Value [Birr] | Amount [KG] | Value [Birr] |
| “Berber/ | SP01 | | | | | | | | |
| “karya” | SP02 | | | | | | | | |
| “Alcha”(Iridi) | SP03 | | | | | | | | |
| Korerima | SP04 | | | | | | | | |
| Timizith | SP05 | | | | | | | | |

| | | | | | | | | | | |
|-------------------------|--------|--|--|--|--|--|--|--|--|--|
| Tikur Bereber | SP06 | | | | | | | | | |
| Camun | Sp07 | | | | | | | | | |
| Tsaeda and Tselim Kemem | SP08 | | | | | | | | | |
| Seseg | SP09 | | | | | | | | | |
| Salt | SP010 | | | | | | | | | |
| Zingible | SP0511 | | | | | | | | | |
| Other spies | SP012 | | | | | | | | | |
| Sub Total | | | | | | | | | | |

F. Cooking Items and Meat Products

| | 1. Food type Consumed | 2. Code | 3. Total food consumed in month of September 2002E.C | | 4. Consumed from purchased | | 5. Consumed From own production | | 6. Consumed From gift or aid | |
|--|---------------------------|---------|--|-----------------|----------------------------|-----------------|---------------------------------|-----------------|------------------------------|-----------------|
| | | | Amount [LT]/KG | Value [Birr] | Amount [LT]/KG | Value [Birr] | Amount [LT]/KG | Value [Birr] | Amount [LT]/KG | Value [Birr] |
| | Cooking oil | CK01 | | | | | | | | |
| | Cooking butter | CK02 | | | | | | | | |
| | Goat/ Mutton meat | CK03 | | | | | | | | |
| | Beef(kefit Siga) | CK04 | | | | | | | | |
| | Chicken (Derho) | CK05 | | | | | | | | |
| | Egg | CK06 | | | | | | | | |
| | Fish | CK07 | | | | | | | | |
| | Milk,Chees (Tseba, riguo) | CK08 | | | | | | | | |
| | Other cooking items | CK09 | | | | | | | | |
| | Sub Total | | | | | | | | | |

G. Other food items

| 1. Food type Consumed | 2. Code | 3 Total food consumed in month of September 2002E.C | | 4 Consumed from purchased | | 5 Consumed From own production | | 6 Consumed From gift or aid | |
|-----------------------------|------------|--|--------|---------------------------------|--------|--------------------------------------|--------|-----------------------------------|--------|
| | | Amount | Value | Amount | Value | Amount | Value | Amount | Value |
| | | [KG] | [Birr] | [KG] | [Birr] | [KG] | [Birr] | [KG] | [Birr] |
| Bread,bani,h imbasha | OTF01 | XXXXXX | | | | | | | |
| Pasta/manco roni | OTF02 | | | | | | | | |
| Ground wheat (fino) | OTF03 | | | | | | | | |
| Injera (derke injera) | OTF04 | XXXXXX | | | | | | | |
| Food out side home | OTF05 | XXXXXX | | | | | | | |
| Biscuit | OTF06 | XXXXXX | | | | | | | |
| Fafa | OTF07 | | | | | | | | |
| Cake | OTF08 | XXXXXX | | | | | | | |
| Marmalade(merit) | OTF09 | XXXXXX | | | | | | | |
| Chocolate | OTF010 | XXXXXX | | | | | | | |
| Chewing gum | OTF011 | XXXXXX | | | | | | | |
| Others | OTF012 | | | | | | | | |
| Sub Total | | | | | | | | | |

H. Other Drinks and Beverages

| 1. Food Consumed | 2. type Code | 3 Total food consumed in month of September 2002E.C | | 4 Consumed from purchased | | 5 Consumed From own production | | 6 Consumed From Gift or aid | |
|------------------------|--------------------|---|-------|---------------------------------|-------|---|-------|-----------------------------------|-------|
| | | Amount | Value | Amount | Value | Amount | Value | Amount | Value |
| | | | | | | | | | |

| | | [KG]/LT | [Birr] | [KG] /LT | [Birr] | [KG]/L T | [Birr]] | [KG]/LT | [Birr] |
|------------------------------------|------|---------|--------|-------------|--------|-------------|-------------|---------|--------|
| Packed water(Highy land) | DB01 | | | | | | | | |
| Local Beer(Siwa) | DB02 | | | | | | | | |
| Mies(Tej) | DB03 | | | | | | | | |
| Soft drink(Lesilasa) | DB04 | | | | | | | | |
| Liquor (Areki, Katilala) | DB05 | | | | | | | | |
| Beer | DB06 | | | | | | | | |
| Coffee | DB07 | | | | | | | | |
| Tea, coffee, Makiato out side home | DB08 | | | | | | | | |
| Birizth(Soft Tej) | DB09 | | | | | | | | |
| Wine Tej | DB10 | | | | | | | | |
| Whisky | DB11 | | | | | | | | |
| Other drinks | DB12 | | | | | | | | |
| Sub Total | | | | | | | | | |

I. Other Consumables

| | 1. Food consumed type | 2. Code | 3 Total food consumed in month of September 2002E.C | | 4 Consumed from purchased | | 5 Consumed From production own | | 6 Consumed from gift or aid | |
|--|---|------------|---|-----------------|---------------------------------|-----------------|--|-----------------|-----------------------------------|-----------------|
| | | | Amount [KG] | Value [Birr] | Amount [KG] | Value [Birr] | Amount [KG] | Value [Birr] | Amount [KG] | Value [Birr] |
| | Haney | OC01 | | | | | | | | |
| | Sugar | OC02 | | | | | | | | |
| | Tea (Shay kitel) | OC03 | | | | | | | | |
| | Flour milk(Hurch Tseba) | OC04 | | | | | | | | |
| | Children food (milk formula and others) | OC05 | | | | | | | | |
| | Packed foods | OC06 | | | | | | | | |
| | Sub Total | | | | | | | | | |

J. Non Food Items Category

1. Educational Expenses

| | 1. Items Purchased | 2. Code | 3 | | 4. | |
|--|--|------------|--|-------------|--|-------|
| | | | Total expenditure in month of September 2002 E.C | | For how long (month/year) will serve the purchased item? | |
| | | | Amount | Value | year | Month |
| | | | <i>Unit</i> | <i>Birr</i> | | |
| | Exercise books, and books | ED01 | | | | |
| | Pens and pencils | ED02 | | | | |
| | Tuition fee | ED03 | | | | |
| | Transport to and from School | ED04 | | | | |
| | Transportation out of Maichew by families with in the month of September | ED05 | | | | |
| | Other expense(school contribution) | ED06 | | | | |
| | Magazines and News papers | ED07 | | | | |
| | School/ College registration | ED08 | | | | |
| | Other educational expenses | ED09 | | | | |
| | Sub Total | | | | | |

2. Expenses on Clothing

| | 1. Items Purchased | 2. Code | 3 | | 4. | |
|--|--|------------|--|------|--|-------|
| | | | Total expenditure in month of September 2002 E.C | | For how long (month/year) will serve the purchased item? | |
| | | | | Birr | year | Month |
| | Student Uniforms | CE01 | | | | |
| | Clothing for fathers/ mothers | CE02 | | | | |
| | Clothing for other families members(excluding uniforms) | CE03 | | | | |
| | Shoes for families | CE04 | | | | |
| | Socks for families | CE05 | | | | |
| | “Fota” | CE06 | | | | |
| | Bed sheets (Ansolla) | CE07 | | | | |

| 1. Items Purchased | 2. Code | 3 Total expenditure in month of September 2002 E.C | | 4. For how long (month/year) will serve the purchased item? | |
|-------------------------|------------|---|--|--|-------|
| | | Birr | | year | Month |
| Blankets(Koberta) | CE08 | | | | |
| Sofa covering | CE09 | | | | |
| “Megareja” | CE010 | | | | |
| Sport’s Cloth | CE012 | | | | |
| Mattress(Firash) | CE013 | | | | |
| Other Clothing expenses | CE014 | | | | |
| Sub Total | | | | | |

a. Medical expenses

Can you give the amount of money of your household’s medical expenses for the month of September 2002? _____

3. Expenditure on Cleaning Items

| 1. Items Purchased | 2. Code | 3 Total expenditure in month of September 2002E.C | | 4. For how long (month/year) will serve the purchased item? | |
|------------------------------|------------|--|--------|---|-------|
| | | [KG] | [Birr] | year | month |
| Hair oil(Zenit, etc) | EC101 | | | | |
| Hair Butter Purchased | EC102 | | | | |
| Hair butter from own product | EC103 | | | | |
| Soap Bar (for clothing) | EC104 | | | | |
| Body Soap(lux,Giv etc) | EC105 | | | | |
| Flour Soap(OMO) | EC106 | | | | |
| Shampoo | EC107 | | | | |
| Hair Salon(women) | EC108 | | | | |
| Hair Salon (Men) | EC109 | | | | |
| Ajax soap | EC1010 | | | | |
| Perfume(Shito) | EC1011 | | | | |
| Air Refresh | EC0112 | | | | |
| Insecticides (Filit) | EC0113 | | | | |
| Cosmetics | EC0114 | | | | |

| | 1. Items Purchased | 2. Code | 3 Total expenditure in month of September 2002E.C | 4. For how long (month/year) will serve the purchased item? | |
|--|-----------------------|------------|---|--|--|
| | Others | EC0115 | | | |
| | Sub Total | | | | |

4. Fire wood, Lighting and Fuel Expenses

| | 1. Items Purchased | 2. Code | 3 Total expenditure in month September 2002 E.C. | 4. For how long (month/year) will e item? | |
|--|--|------------|--|---|-------|
| | | | | Year | Month |
| | Firewood | FL01 | | | |
| | Animal Dung(Akor) | FL02 | | | |
| | Coal(Faham) | FL03 | | | |
| | Cooking (lighting gas),lamba | FL04 | | | |
| | Match(kibrit) | FL05 | | | |
| | Candel,/Tiwaf | FL06 | | | |
| | Battery for radio, Tape, Hand torch(Lamibadina) | FL07 | | | |
| | Electricity(Kw/hr) | FL08 | | | |
| | Masho(Fanos) | FL09 | | | |
| | Others | FL010 | | | |
| | Sub Total | | | | |

5. Others expenses

| | 1. Items Purchased | 2. Code | 3 Total expenditure in month September 2002E.C | 4. For how long (month/year) will serve the purchased item? | | |
|--|---------------------------|------------|--|--|--------|-------|
| | | | Amount | Value | Amount | Value |
| | Tobacco(Cigarate) | OE01 | | | | |
| | Chat | OE02 | | | | |
| | Recreation | | | | | |
| | Palms Giving(Mitswat) | OE03 | | | | |
| | Community | OE04 | | | | |

| | | | | | | | |
|---|--------------------------------------|-------|--|--|--|--|--|
| | contribution(Mahibera t/ Kebelle) | | | | | | |
| | Church/ religion Contribution | OE05 | | | | | |
| | Iritiban | OE06 | | | | | |
| | Teskar | OE07 | | | | | |
| | Wedding(Merea) | OE08 | | | | | |
| | Child baptisms(Kristina) | OE09 | | | | | |
| | Ildir | OE010 | | | | | |
| | Tsebel | OE011 | | | | | |
| | Guard(private/ common) payment | OE012 | | | | | |
| | Servant payment | OE013 | | | | | |
| | Shepard payment | OE014 | | | | | |
| | Remittance for relatives out side | OE015 | | | | | |
| | Miachew | | | | | | |
| | Others | OE016 | | | | | |
| — | Subtotal | | | | | | |

6. Household Items Purchase and Asset own

1. Household Items

| | 1. Items Purchased | 2. Code | 3. Total expenditu re made | 4. Time purchased of the item | |
|--|-----------------------------|------------|-------------------------------------|---|--|
| | | | <i>Birr</i> | Year | |
| | Sofa Set(WI) | HI01 | | | |
| | Chair, bench, Table etc(WI) | HI02 | | | |
| | Bed(Metal or wood) (WI) | HI03 | | | |
| | Tape recorder/radio(WI) | HI04 | | | |
| | Sub Total | | | | |

2. Asset

| | 1. Item | 2. Code | 3 Total Expenditure on the item | 4. Time of purchased the item(year) |
|--|---------------------------|------------|---------------------------------------|---|
| | Cart(Gari) | AS01 | | |
| | Car | AS02 | | |
| | Bicycle | AS03 | | |
| | Motor cycle | AS04 | | |
| | Sawing machine | AS05 | | |
| | Water Pump Machine(| AS06 | | |
| | Mill machine(Metihan)) | AS07 | | |
| | Refrigerator | AS08 | | |
| | TV | AS014 | | |
| | Mobile phone | AS020 | | |
| | Land line phone | AS021 | | |
| | Cow | AS022 | | |
| | Ox | AS023 | | |
| | Goat | AS024 | | |
| | Sheep | AS025 | | |
| | Pig(Asama) | AS026 | | |
| | Donkey | AS027 | | |
| | Horse | AS028 | | |
| | Mule | AS029 | | |
| | Camel | AS030 | | |
| | Poultry | AS031 | | |
| | Other domestic animals | AS032 | | |
| | Subtotal | | | |

Thank You for your kind Cooperation!

Appendices

Annex table 1: Energy content per 100 gm of edible portion of food items consumed by the bottom 50% poor

| Food Items | K.calori value |
|----------------------|----------------|
| Wheat | 351 |
| Teff | 341 |
| Barely | 354 |
| Maize | 362 |
| Beans | 344 |
| Lents | 370 |
| Onion | 42 |
| Tea | 29 |
| Tomato | 70 |
| Potato | 87 |
| Cabbage(T.gomen) | 25 |
| Galaric | 149 |
| Berebery(red pipper) | 318 |
| Cooking oil | 884 |
| Coffee | 2 |
| Sugar | 400 |
| Beef | 235 |
| Chicken | 140 |
| Sorghum | 347 |
| Chick peas(Shimbira) | 341 |
| Egg | 68 |
| Soybean(Dekeko) | 405 |
| Salt | 0 |

Source: WHO

Annex table 2: Computation of Food poverty Line (Current market price)

| Food items | Av.Con. per adult per month/kg of food items(A) | Caloric value of each food(B) | Total calories peradu.eq per month(C=A* B*10) | Scaling up/down of A $D = \left[\frac{66000}{56210.9} \right] * A$ | Median price of each food items | Food poverty line permonthly (Birr) |
|---------------------|---|-------------------------------|---|--|---------------------------------|-------------------------------------|
| wheat | 2.24 | 351 | 7,862.40 | 2.63 | 6.2 | 16.31 |
| Teff | 3.94 | 341 | 13,435.40 | 4.63 | 10 | 46.26 |
| Barely | 3.93 | 354 | 13,912.20 | 4.61 | 5.6 | 25.84 |
| Maize | 1.18 | 362 | 4,271.60 | 1.39 | 4.4 | 6.1 |
| Beans | 1.21 | 344 | 4,162.40 | 1.42 | 6.4 | 9.09 |
| Lents | 0.48 | 370 | 1,776.00 | 0.56 | 9.6 | 5.41 |
| Onion | 0.57 | 42 | 2,39.40 | 0.67 | 7.8 | 5.22 |
| Tea | 0.02 | 29 | 5.80 | 0.02 | 0.77 | 0.02 |
| Tomato | 0.38 | 70 | 266.00 | 0.45 | 7 | 3.12 |
| Petato | 0.43 | 87 | 374.10 | 0.50 | 8 | 4.04 |
| Cabage(T.Go men) | 0.12 | 25 | 30.00 | 0.14 | 2.5 | 0.35 |
| Galaric | 0.08 | 149 | 119.20 | 0.09 | 15.5 | 1.46 |
| Berbere | 0.4 | 318 | 1,272.00 | 0.47 | 23 | 10.80 |
| Cooking oil | 0.38 | 884 | 3,359.20 | 0.45 | 20 | 8.92 |
| Coffee | 0.2 | 2 | 4.00 | 0.23 | 50 | 11.74 |
| Sugar | 0.36 | 400 | 1,440.00 | 0.42 | 15 | 6.34 |
| Beef | 0.38 | 235 | 8,93.00 | 0.45 | 36 | 16.06 |
| Chieken | 0.18 | 140 | 252.00 | 0.21 | 24 | 5.07 |
| Sorgum | 0.49 | 347 | 1700.30 | 0.58 | 4 | 2.3 |
| Chick peas(Shimbra) | 0.16 | 341 | 545.60 | 0.19 | 7 | 1.32 |
| Egg | 0.01 | 68 | 6.80 | 0.01 | 25 | 0.29 |
| Soybean(Deke ko) | 0.07 | 405 | 283.50 | 0.08 | 9.6 | 0.79 |
| Salt | 0.26 | 0 | 0.00 | 0.03 | 3 | 0.09 |
| | | | 56,210.90. | 20.24 | | 186.95 |

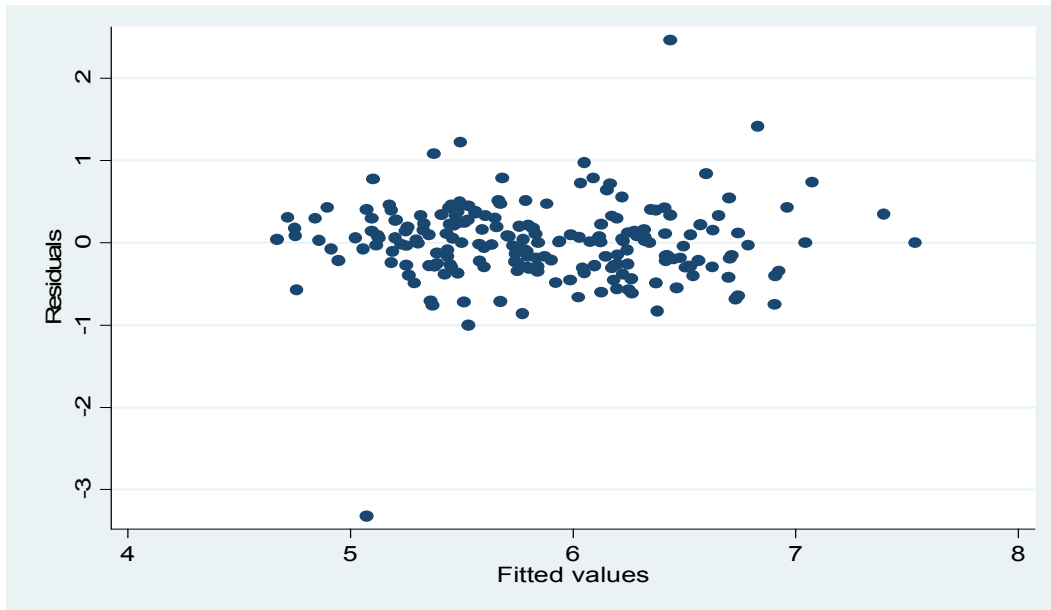
Source: Compute from own survey data, 2009

Annex table 3. Detecting heteroskedasticity in OLS regression (consumption model)

| Type of test | Detecting for | Model | chi2(1) | Prob > chi2 | Ho=0(constant variance) | Conclusion |
|--|--------------------|-------|---------|-------------|-------------------------------------|--|
| Breusch-Pagan or Cook-Weisberg (estat htest) | Heteroskedasticity | OLS | 1.87 | 0.1715 | Reject at 5% level of significance) | Problem of heteroskedasticity is prevailed |

Source: compute from own survey, 2009

Graphical method of detecting heteroskedasticity consumption function (OLS model)



Annex table 4: Detecting Endogeneity using Housman test

Step I: OLS regression of one explanatory variable that is susceptible to expressed by the other variable and finds the prediction of the residual of the model.

reg famsize dependence ratio head female headeduc spouseeduc headfarmer headpettytrade

| famsize | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] | |
|--------------|-----------|-----------|-------|-------|----------------------|----------|
| dependence~o | .2293547 | .1483814 | 1.55 | 0.124 | -.0632745 | .5219838 |
| headfemale | -1.7574 | .29436 | -5.97 | 0.000 | -2.337919 | -1.17688 |
| headeduc | .0024007 | .0261932 | 0.09 | 0.927 | -.049256 | .0540573 |
| spouseeduc | -.0104598 | .0283153 | -0.37 | 0.712 | -.0663016 | .0453819 |
| headfarmer | .2419071 | .4405771 | 0.55 | 0.584 | -.6269732 | 1.110787 |
| headpettyt~e | .6168027 | .3102257 | 1.99 | 0.048 | .0049938 | 1.228612 |
| _cons | 5.001999 | .3402433 | 14.70 | 0.000 | 4.330992 | 5.673007 |

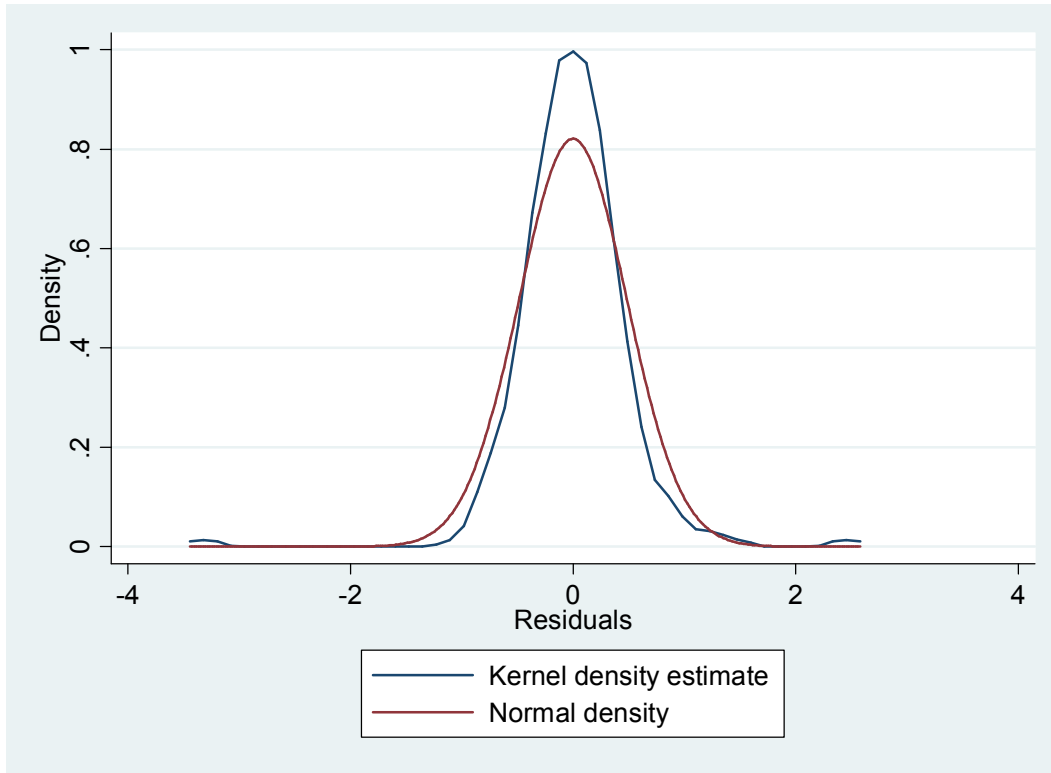
| | | | |
|-----------------|----------|-----------------|--------|
| Number of obs = | 203 | R-squared = | 0.2007 |
| F(6, 196) = | 8.20 | Adj R-squared = | 0.1762 |
| Prob > F | = 0.0000 | | |

Predict res, residual

Step II. OLS regression of the consumption model against the explanatory variables including the prediction of the residual value but excluding the variable which assigned as a dependent variable in step I.

Step III: Check the t- statistics of residual value at 5% level of significance. Accordingly, the null hypothesis is accepted implied that problem of endogeneity is not prevail in the data.

Annex 5: Normality Test using Kernel density normality test



Annex table 6: Calorie Based Nutrition Adult Equivalence Scales

| Years of age | Male | Female |
|--------------|------|--------|
| 0-1 | 0.33 | 0.33 |
| 1-2 | 0.46 | 0.46 |
| 2-3 | 0.54 | 0.54 |
| 3-5 | 0.62 | 0.62 |
| 5-7 | 0.74 | 0.70 |
| 7-10 | 0.84 | 0.72 |
| 10-12 | 0.88 | 0.78 |
| 12-14 | 0.96 | 0.84 |
| 14-16 | 1.06 | 0.86 |
| 16-18 | 1.14 | 0.86 |
| 18-30 | 1.04 | 0.80 |
| 30-60 | 1.00 | 0.82 |
| 60+ | 0.84 | 0.74 |

Source: Source: Calculated from the World Health Organization (1998) by Stefan Dercon.

Annex table 7: Correlation matrix of variables in Multinomial Logit Regression

. Pwcorr house condition changeyearsofedu job experience income change birthplace, sig

| | Housec~n | change~u | jobexp~e | income~e | birthp~e |
|----------|----------|----------|----------|----------|----------|
| Housec~n | 1.0000 | | | | |
| change~u | 0.1448 | 1.0000 | | | |
| | 0.0383 | | | | |
| income~e | 0.1391 | 0.5468 | 0.5786 | 1.0000 | |
| | 0.0467 | 0.0000 | 0.0000 | | |
| birthp~e | 0.0686 | 0.0159 | -0.0484 | -0.0776 | 1.0000 |
| | 0.3284 | 0.8206 | 0.4905 | 0.2689 | |

Annex 8: Definition of housing quality index, service index and Property index

An important variable in household's information for welfare measurement data is the status of residential house, service equipped to the house and possessing of durable goods which attempt to measure the relative poverty status of households. The manipulation of property index is taking the mean of the eleven household durable properties like radio, sofa set, table, TV, Refrigerator and etc. Similarly, asset index is calculated by taking the mean of productive and livestock assets. We also include other index for instance housing quality index, and service index. For all indices, the data collection mechanism is by asking owning or not owning for the list of items and accounted by the dummy variables 1 for owning and 0 not owning. The procedure for computing these indices as follow(adopted from Weldehan.T,2008).

A. The housing quality index constructs based on the following four variables:

- a. The number of persons per person (continuous variable)
- b. Dummy variable equal to one if the dwelling floor was made of a finished material (such as cement, tile or a laminated material), 0 otherwise.
- c. Dummy variable equal to one if the dwelling wall made from brick or plastered wall, or a sturdy roof (such as corrugated iron, tiles or concrete, 0 otherwise
- d. Dummy variable equal to one if the dwelling floor is durable, 0 otherwise.

Therefore, Housing quality index becomes

$$A(\text{ housing quality index}) = \left[\frac{a + b + c + d}{4} \right]$$

B. Service Index calculation

- a. dummy variable equal to one if the household's source of drinking water was piped into the dwelling or yard,0 otherwise.
- b. dummy variable equal to one if the household had electricity, 0 otherwise.
- c. dummy variable equal to one if the household had sanitation service.0 otherwise.
- d. dummy variable equal to one if the household had cooking fuel, 0 otherwise.

$$B(\text{ Service Index}) = \left[\frac{a + b + c + d}{4} \right]$$

C. Property index calculation

- a. dummy variable equal to one if the household had radio/ tape ,0 otherwise.
- b. dummy variable equal to one if the household house had motor vehicle ,0 otherwise.
- c. dummy variable equal to one if the household house had fridge(Refrigerator),0 otherwise.
- d. dummy variable equal to one if the household had Television, 0 otherwise.

- e. dummy variable equal to one if the household had sofa set, 0 otherwise.
- f. dummy variable equal to one if the household had chair/ table, 0 otherwise.
- g. dummy variable equal to one if the household had motorbike, 0 otherwise.
- h. dummy variable equal to one if the household had landline phone, 0 otherwise.
- i. dummy variable equal to one if the household had mobile phone, 0 otherwise.
- j. dummy variable equal to one if the household had modern bed, 0 otherwise.
- k. dummy variable equal to one if the household had bicycle, 0 otherwise.

$$C(\text{Property index}) = \left[\frac{a + b + c + d + e + f + g + h + i + j + k}{11} \right]$$

Annex table 9: AIC and BIC testing of model fit (OLS model)

The fitted model value is greater than the null model value. Then accept H₀ at 5% level of significance implies that the model is fit.

Command: estat ic

| Model | Obs | ll(null) | ll(model) | df | AIC | BIC |
|-------|-----|----------|-----------|----|--------|--------|
| | 205 | -225.31 | -135.49 | 24 | 318.98 | 398.51 |

