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Faculty of Science
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Determinants of Urban Household
Poverty in Addis Ababa

By

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ACRONYMS

CSA	Central Statistics Agency
HICES	Household income consumption expenditure survey
WMS	Welfare monitoring survey
CBN	Cost of basic needs
HH	Household
FEI	Food energy intake
MOFED	Ministry of finance and economic development
UNDP	United Nations development program
NGO	Non government organizations
CPI	consumer price index
M&E	Monitoring and evaluation
USD	United states dollar
ETB	Ethiopian birr
WB	World Bank
PPP	Purchasing power parity
Cal	Calorie
EUEEC	Ethiopian Urban Economic Establishment Center
EHNRI	Ethiopian Health and Nutrition Research Institute
MKcal/kg	Mean kilocalorie per kilogram
Mprice/kg	Mean price per kilogram.

Abstract

It is true that urban areas are hopes of life for they are centers of income, commerce, wealth, education and the like. On the other hand, there are several challenges of which one of them is urban poverty. In Ethiopia, while a number of studies have been conducted in rural areas, those concerning urban poverty are limited. Obviously it is important to understand the nature and scale of urbanization, the various deriving forces that affect it and determinants of urban poverty as linked to this process. Thus, this study assesses the determinants of urban household poverty in Addis Ababa based on survey data using logistic regression.

Based on the cost of basic needs approach, out of the 3462 surveyed households, 1415 of them were found to be poor, that is, the head count is 40.9%. The poverty gap and severity of poverty indices were found out to be, 0.15 and 0.07, respectively. This calls for urgent intervention aimed at fighting poverty. Among the variables (factors) used in this study, place of residence, household size, income source, educational and employment status of heads of households, ownership of house and ownership of tap water inside the compound were found out to be significant determinants of the poverty status of households in Addis Ababa.

Table of contents

Acknowledgements.....	III
Acronyms	IV
Abstract	V

CHAPTER	Page
1. INTRODUCTION	1
1.1. Background	1
1.2. Statement of the problem	2
1.3. Objectives.....	3
1.4. Limitations of the study	4
2. LITERATURE REVIEW	5
2.1. Conceptual frame work of poverty.....	5
2.2. Urbanization and Poverty	6
2.3. Poverty lines	10
2.4. Poverty measures	13
2.5. The foster, Greer, and Thorbecke index (P_{α})	15
2.6. Some empirical evidences of poverty profile in Ethiopia.....	15
3. METHODOLOGY AND DATA SOURCE.....	18
3.1. Data source	18
3.2. Construction of poverty line.....	19
3.3. Logistic regression model	23
3.4. Estimation of the logit model	25
3.5. Statistical inference	28

3.6. Model diagnostics.....	29
3.7. Model variables	31
4. DISCUSSION AND RESULTS.....	36
4.1. Identification of the poor	36
4.2. Bivariate analysis	42
4.3. Multivariate analysis	46
4.3.1. Model diagnostics	46
4.3.2. Interpretation of results	47
5. CONCLUSIONS AND POLICY IMPLICATIONS.....	52
Reference	54
Appendix.....	57
Appendix A. Nutrition calorie based equivalent scale.....	57
Appendix B. Percentages of food shares for households in the lower half of expenditure distribution in Addis Ababa from (2004/05) HICES.....	58
Appendix C. Food shares of each food bundles from total food Bundles and total food budget in Addis Ababa (2004/05).....	59
Appendix D. Parameter coding	60
Appendix E. place of residence and household size versus Poverty status of the household.....	62
Appendix F. source of income versus poverty status of the household.....	63
Appendix G. Sex and Age versus poverty status.....	64
Appendix H. Education and Employment status versus poverty status	65
Appendix I. Basis of the household to occupy the versus poverty status.....	66
Appendix. K. Source of drinking water and health situation Versus poverty status of the household	67

CHAPTER ONE

INTRODUCTION

1.1 Background

By any standard, Ethiopia is one of the poorest countries in the world. Poverty in Ethiopia is a long standing problem. It manifests itself in a number of ways and this in fact is attributed to a multiple of interrelated factors. Getahun (Getahun, 2002, cited by Tesfaye, 2005), for example; identifies these factors as insufficient source of income, lack of asset/skill, poor health status, poor educational level, very high infant mortality rate, crowded housing condition and others.

Based on the national poverty line of the year 2004/05, 38.3 percent of the population is poor. (MOFED, 2007). World bank (2002) and UNDP (2003) as quoted in Yared (2005) reported that the country has one of the lowest GNP per capita in the world with its purchasing power parity (PPP) adjusted GNP ranking of 200 out of 206 countries.

Although, the above situations are believed to be universal, there are obviously some differences between the causes, process and consequences of poverty among the urban and rural societies. This is due to the fact that urban life is more complex than that of rural. Some countries like those in East Asia are about to escape from the category of least developed countries because of their continuous fight against poverty. Ethiopia, however, did not join this track because of the inability to reduce poverty as is expected. The fundamental question that comes in front of us is what makes us still poor and what factors contributed to this.

1.2 Research problem

In Ethiopia poverty is the general feature of the nation and is causing many sufferings to the largest proportion of the population. It is the main agenda of the government, donor agencies, NGOs, and other organizations that have the willingness to reduce the level and minimize the effect and its associated impacts on the wellbeing of the people.

Though in absolute terms poverty is still a rural phenomena, recently the problem is spreading to urban areas. The number of urban poor is increasing at unpredicted level that might be due to the huge rural-urban migration and alarming internal population growth. In the mean time, the urban economy has limited capacity to accommodate the unpredicted population explosion.

Even if the effects of urban poverty in Ethiopia are getting severe, the factors that account for it are not studied very well. One of the challenges in the fight against poverty is clear identification of the prevailing factors. Therefore, examination of those factors that aggravate poverty is important. Among many factors of poverty are the socioeconomic and demographic factors such as income, educational level, employment, health status, family size, age, sex, and marital status.

Identifying their potential effects to poverty is critical in the study of urban poverty, since these factors give a clue to find a solution on the commendable life of urban dwellers. Addis Ababa, which is the capital city of Ethiopia and a center of intercontinental and international organizations, embassies, etc, faces great challenges of urban poverty. According to Ministry of works and urban development (2000), some of the issues are unemployment, high food and house renting prices, large population size, crowded housing condition and lack of transportation.

1.3. Objectives of the study

General Objective:-To assess the determinants of urban household poverty in Addis Ababa.

Specific Objectives

1. To identify households who live below the poverty line.
2. To examine determinants of urban household poverty in Addis Ababa:
 - ✓ To analyze some determinants: demographic characteristics of the household head (age, sex, and marital status), family size, household head's educational level and employment status.
 - ✓ To assess households social services, water and housing tenure in relation to poverty.
 - ✓ To assess the relationships (positive or negative) of these variables on urban poverty in Addis Ababa.
 - ✓ To identify determinants which dominantly affect urban poverty in Addis Ababa
3. To draw possible research and policy implications.

1.4 Limitations:

The constraints of this paper are:

1. The base of the surveyed households, the kebele registry-sampling frame, includes only those households that have house number. The survey did not cover the homeless poor in the study area. This may underestimate the level of poverty since the urban poor includes individuals who are homeless and sleep on the streets, public places or illegal settlements and cheap boarding house where the survey did not cover . Hence, the survey may underestimate the extent of urban household poverty and the associated findings may be biased in relation to this under estimation.
 2. Urban household poverty is a function of multitude factors. In this study, the variables analyzed are limited to those captured by 2004 WMS and 2004/05 HICES.
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CHAPTER TWO

2.1 Conceptual framework of Poverty

and related literature review

The concept of poverty seems simple, but is not simple if we go deep in to it. This is due to its multidimensional and multi faceted nature. Being poor means that a person is marginalized in the decision making process of community; is discriminated against society, feels generally that he has no abiding roots in the community, is usually displaced to the more environmentally unsafe areas of societal space; and he and his family members, particularly his women and children, are vulnerable to various hazards and threats (Mabogunje, 2005).

Nationally, poverty is defined in absolute and relative measure. According to Eshetu (1995), if poverty is defined in terms of the amount household income and in terms of expenditure on the minimum essentials of food, clothes and other basic needs, such an approach to defining poverty is called an absolute measure. A household under this definition is then said to be poor if its total consumption is below a specified amount. Poverty is most often defined in relative terms when one's level of poverty depends upon the incomes of others in the community. If the income of a certain family is 50 percent lower than the average income of the given community, the family may consider itself poor even though its income level is above the poverty line. Therefore, in relative sense of defining poverty, one might categorize a household as poor if the household income is below a certain percent of average household income. These definitions have been particularly useful in establishing quantitative indicators of poverty. Such indicators include per capita income, per capita consumption of essential items, per capita food consumption, food ratio, calorie intake and expense for medical cases. These indicators affect both the

measurement of poverty and the design of anti-poverty policies (Lipton and Ravallion, 1995); the debate on the measurement of poverty has focused on deriving an index of poverty satisfying certain ethical properties.

There are different approaches to the measurement of poverty, as welfarist that makes use of the concept of the social welfare function, or non-welfarist or the “capability” approach that eventually inspired the publication of the Human development index by the UNDP. Nevertheless, the dominant approach to the measurement of poverty is money-metric, measuring income or expenditure per capita. The money-metric approach generally involves two interrelated steps (Sen, 1976, 1980). The first step is identification of the poor which requires the setting of poverty line to distinguish the poor from non-poor. How the poverty line is constructed crucially affects the results, and thus, is controversial. The second step in the measurement of poverty is aggregating the degree of poverty experienced by the poor, which rests essentially on two fundamental concepts: average and relative deprivation (Sen, 1976, cited by Bereket and Ababe, 2005). Average deprivation is the proportional deviation of the mean income of the poor from the designated poverty line, while relative poverty refers to inequality among the poor. The pioneering work by Sen (1976), which is consisted of the formulation of axioms that should hold in the measurement of poverty, argued that any poverty- index should be able to provide the three basic pieces of information: who are the poor, their average deprivation and their relative deprivation.

2.2. Urbanization and poverty

According to Bigsten, Bereket, and Abebe (2005), urban settlements have been defined as large, compact, densely built up areas where open spaces are often in short supply except at the periphery. Their population tends to be heterogeneous and socially diversified such that kinship relationship tends to

be of minimal importance. Goods and services have largely been commoditized such that every thing tends to have a price tag to it.

Given these broad characteristics of urban settlements, Stterthwait (2001, cited by Bigston, 2005) argues that urban poverty tends to exhibit eight major aspects. These are:

1. Inadequate income that gives rise to inadequate consumption of necessities.
2. Inadequate, unstable or risky asset base both material and non-material including educational attainment and housing for individuals, households or communities.
3. Inadequate shelter that is typically of poor quality, over crowded and insecure.
4. ~~Inadequate provision of “public” infrastructure comprising piped water, sanitation, drainage, roads, foot paths, and the like which increase health burden and often work burden.~~
5. Inadequate provision of basic services such as day care centers, schools, vocational training centers, health care clinics, emergency services units, public transport, communications and law enforcement.
6. Limited or no safety net to ensure that basic consumption can be maintained when income fall as well as to ensure access to shelter and healthcare when these can no longer be paid for.
7. Inadequate protection of poor groups through the operation of right, occupational health and safety, pollution control, environmental health, protection from violence and other crimes. Protection from discrimination and exploitations.

8. Voicelessness and powerlessness within political systems and bureaucratic structures, leading to little or no possibility of receiving entitlements, organization, making demands, and getting fair response.

According to Abebe, Bereket and Mekonnen (2005), by the mid 1990s the urban population in Ethiopia had increased to about 15 percent of the total population of about 60 million. Since the urban economy has not been very dynamic, many urban incomes are very low. This tells us that poverty is not just a rural problem. Based on poverty profile and stochastic dominance estimates, they found that the incidence of poverty was as high in the urban as in the rural areas, which is unusual in Africa. Their head count measure of poverty was 41.2% nationally for 1994 (41.9 % rural and 37.5 % urban), declining to 35.5 % in 1997 for both rural and urban areas although the change in the urban poverty was not statistically significant. Income inequality worsened during this period. They have also investigated the change in urban poverty in Addis Ababa, northern towns, and southern towns between 1994 and 1997. Addis Ababa showed an increase in per capita consumption expenditure, but generally, there was no statistically significant poverty reduction in both the northern and southern towns (Bereket and Abebe, 2005).

They found a substantial increase in urban income from 1994 to 1997, but decidedly uneven, ranging from 2 % for the bottom quintile to 23 % for the top; growth hadn't trickled down to any great degree. According to United Nations (Ministry of works and urban development, 2000) centre for human settlements UNCHS (Habitat), the poverty situation in Addis Ababa revealed that quite a substantial proportion of the inhabitants (about 50%) live under total poverty line. These people earn a very low income which is not sufficient to buy minimum food basket and basic non-food items. Unemployment in the city is on the rise and has become a major threat for survival.

Underemployment and poverty of those who work are also clearly noticeable in the city. The majority of those who work in the city are engaged in the informal sector, which is characterized by low income, poor working conditions and no bright prospect. The housing and land access situations in the city are deplorable for the poor. The provision of services such as water, sanitation and solid waste are inadequate in the city at large, and the urban poor suffer due to absence of mechanisms to assist the poor.

The poverty situation in Addis Ababa becomes worse as there are several groups in the city that could be associated with social exclusion. The city houses quite a substantial number of street children, prostitutes, beggars, etc who actually are disadvantaged in terms of several dimensions of poverty. The above situation in the city is further packaged in unequal relationship between the sexes. Women in the city, though high in number, are the ones who suffer most from lack of services and infrastructure, as they have to cater for the household. Women in the city also suffer from high unemployment rate and those who are employed are engaged in petty commodity trade, prostitution and fuel wood collecting. The causes of poverty in the city are quite complex and have many deep-seated roots. According to the Ministry of works and urban development (2000), the stagnation of the rural economy is definitely one of the major problems that continue to feed migrants to the city who have no alternatives but join the urban poor and struggle for survival. Most beggars, prostitutes and informal sector workers in the city have rural origin. War and drought also have their own share in increasing poverty in the city.

2.3. Poverty Lines

Poverty lines are those cut-off lines in the economic welfare dimension of the populations across any geographical region below which households or individuals are considered poor. This measure is called absolute poverty line. One of the weaknesses of an absolute poverty line is that it does not change with the living standards of the society in question (Esubalew, 2006). Furthermore; it may be difficult in practice to define the absolute minimum in a constant way. Though the dividing line between acceptable and unacceptable deprivation is said to be biological, it changes in line with age, sex, season, climate, physical built-up, type of activities a person is engaged with and others. On the other hand, relative poverty line measure is defined as how income and inequality is distributed in a society. This measure of poverty depends on the parameters of Lorenz curve, which is a measure of inequality. However, this measure is a good measure of relative poverty to the extent that ~~one is trying to capture the amount of inequality in that distribution~~ (Ravallion, 1992).

Although the choice of poverty line is always arbitrary (World Bank, 2000), in the poverty literature, measurement of poverty line can be done in two main different ways. The first one is to directly use the current consumption as an indicator of living standard. In this case, we have to identify the minimum bundle of goods and services that an individual has to consume in a given society. Hence, the bundle can be considered as a border line between poor and non-poor in the sense that an individual is said to be poor if he/she fails to achieve consumptions of the specified goods in the bundle. The second method uses income as a parameter to identify an individual as poor or non-poor. These necessities specifying minimum income that enables an individual to achieve consumption of minimum bundle of goods and services, which is defined by the minimum socially acceptable level. Generally, the preferred

indicator of household standards is suitably a comprehensive measure of current real consumption given by a price weighted aggregated over all marketed commodity consumed by the household from all sources (purchases, gifts and on production). There are two reasons why this is often preferred over current income.

Firstly, current consumption is often taken to be a better indicator than current income to assess current standard of living; it is assumed that within a period utility depends directly on within period consumption.

Secondly, current consumption may also be a good indicator of long term average well-being, as it will reveal information about incomes at the other dates (in the past and the future) (Lipton and Ravallion, 1995, cited by Girma , 1997).

Another method to drive poverty line is income, especially per capita income as an indicator of welfare. But there are two main criticisms of its use in defining poverty. The theoretical objection is that in many developing countries the income of many people, such as those working agricultural activities, may vary from year to year. Both common sense and the permanent income hypothesis of Fridman (Fridman, 1957, cited by Haji.R, and Ukm.I 2004) suggest that people with variable incomes tend to save in abundant years and draw on past savings in lean alones. Thus, a given year's income may not say that much about a household's level of welfare as indicated by annual consumption. The practical problem of incomes to indicate welfare lies in the measurement of incomes of self employed, and is of less of problem for wage earners. But wage earners form only a small portion of the population in many less developed countries (Girma, 1997).

In practice, the methods that have been commonly used to define poverty line are food energy intake(FEI) and cost of basic needs approach (Ravallion,1994).Both approaches are based on the assumption that there is a

minimum energy requirement for a typical person to keep up normal activities, such as the 2,200 cal per day threshold stipulated by the World Health Organization(1985).Thus, the food energy intake method attempts to identify the total consumption expenditure a person is expected to have to attain the minimum food energy requirement. This is accomplished by regressing calorie intake on consumption expenditure or income. The poverty line, then, becomes the level of total expenditure at which the minimum energy requirement is met (Greer and Thorbecke 1998; Ravallion 1994, cited by Tesfaye, 2006). The advantage of this method is that it automatically includes an allowance for non-food goods, avoiding one of the difficulties mentioned above. However, it may lead to an inconsistent poverty comparison across sub-groups or over time since people with the same command over basic consumption needs will not in general be treated in the same way (Lipton and Ravallion 1995).

~~An alternative method of deriving the poverty line, which is a version of basic needs approach, is suggested by Ravallion and Bidani (Ravallion and Bidani, 1994 cited by Qureshi.K, 2001). In this method, a basket of goods for which basic food requirements will be met is defined. The cost of this basket at market prices becomes the food poverty line. Then an allowance for non-food goods, based on households in the lower half of the expenditure distribution for non – food expense, is added on the food poverty line to obtain the total poverty line. This can be done mostly by dividing the food poverty line with the food share of these reference populations.~~

Deriving the poverty line using the cost of basic needs approach, however, presents some difficulties. For example, setting the food energy requirement may be problematic as there are significant variations among people in physical features and work habits. This renders the task of setting a minimum energy requirement, even for a specific group in a specific region, daunting. Even after a minimum requirement is set, there remains the problem of

choosing a food bundle that meets it (Sen, 1999). A bundle that meets the requirement at minimum cost (given prevailing prices) could be chosen, but such a bundle is of little relevance if it is not in tune with the eating habit of the individuals (reference populations). The second difficulty associated with deriving the basic needs approach poverty line is in making an allowance for non-food goods, since there is no objective criteria on which to base the minimum amount as cut off points. However, the basic needs approach is the most widely used approach for setting consistent poverty line.

2.4. Poverty Measures

Identifying the poverty line facilitates identification of the poor. The next important issue is the choice of an appropriate poverty measure to aggregate the information on individual's welfare. There is quite an extensive literature on poverty measures. The earliest and perhaps most famous measures of poverty are the head count ratio and the poverty gap measure. The head count ratio gives the proportion of people who are poor, that is:

$$P_0 = \frac{q}{N}$$

where P_0 is the head count ratio, q is the number of individuals identified as poor and N is the population size. The poverty gap measure provides an indication of the aggregate shortfall of the poor from the poverty line. That is:

$$\begin{aligned} P_1 &= \frac{1}{N} \sum_{i=1}^q \frac{(Z - Y_i)}{Z} = \frac{1}{N} \left[q - \sum_{i=1}^q \frac{Y_i}{Z} \right] \\ &= \frac{q}{N} - \sum_{i=1}^q \frac{Y_i}{NZ} \end{aligned}$$

$$= \frac{q}{N} - \frac{q \cdot Y_p}{NZ} = \frac{q}{N} \left[1 - \frac{Y_p}{Z} \right] = P_0 \cdot I$$

where Y_i = consumption expenditure or income of the i^{th} poor households.

Z = poverty line

Y_p = mean consumption or income of the poor

I = mean depth of poverty as a proportion of poverty line

Thus, this index is the product of P_0 , the incidence of poverty, and I , intensity of poverty which is insensitive to the number of individuals below the poverty line and to the transfer of income among the poor. But this index can be normalized to obtain the income gap ratio by expressing it as the percentage of shortfall of the average income of the poor from the poverty line. This is given by:

$$I = \frac{1}{q} \sum_{i=1}^q \left[\frac{(Z - Y_i)}{Z} \right] = \frac{PG}{qZ}$$

where $PG = \sum_{i=1}^q (Z - Y_i)$ is the poverty gap, which provides an indication of the aggregate shortfall of the poor from the poverty line

Sen. (1976), cited by Tesfaye (2006), argued that poverty measures should satisfy the following two desirable axioms:

Axiom 1: A reduction in the income of the poor increases the poverty measure. This is known as the 'monotonicity' axiom.

Axiom 2: A pure transfer of income from a poor person to any one richer increases the poverty measures. This is known as 'transfer' axiom.

2.5. The Foster, Greer, and Thorbecke index (P_α)

This index satisfies both the ‘monotonicity’ and the ‘transfer’ axioms. That is axiom 1 satisfied when $\alpha = 1$ and axiom 2 satisfied when $\alpha = 2$, which is given by:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^q \left[\frac{(Z - Y_i)}{Z} \right]^\alpha \quad \text{for } 0 \leq \alpha \leq 2 \text{ and } Y_i < Z$$

where α is the poverty aversion parameter, and $(Z - Y_i)$ is the income shortfall of the i^{th} household or individual,

In other words, P_α changes when α takes different values: that is, when α is 0, 1 and 2, P_α becomes head count index (P_0) poverty gap index (P_1) and poverty severity measure (P_2), respectively. P_2 is the measure of mean square proportionate poverty gaps. It gives more weight to the poverty of the poorest by squaring and averaging the gap. The most commonly used value of α (greater than 1) is 2, which measures the severity of poverty. In this case, the FGT measure is simply the weighted sum of poverty gaps, as a proportion of the poverty line, where the weights are the poverty gaps themselves (Ravallion, 1994). Thus in order to estimate the incidence, depth and severity of poverty, Foster, Greer and Thorbecke (FGT) index is preferable.

2.6. Some empirical evidence of poverty profile in Ethiopia

According to Tesfaye (2006), one of the earliest attempts to examine urban poverty in Ethiopia was by Tadesse (1996) using the 1994 Ethiopian Urban Households survey (EUHS). The survey provided, among other things, information on the demographic and consumption behavior of 1,500 households randomly selected from seven urban center of the country (Addis

Ababa, Dessie, Mekelle, Awassa, Jimma, Bahir Dar and Dire Dawa). The analysis in Tadesse (1996) was limited to food poverty in recognition of the fact that satisfaction of basic food requirements remains a major problem for poor households in Ethiopia. Food poverty line estimates were obtained in accordance with the food energy intake method, where by total expenditure on food is regressed on calorific consumption (Greer and Thorbecke, 1986 as cited by Esubalew, 2006). The findings confirm the hypothesis that there is abject poverty in Urban Ethiopia, with 39% of population living below the food poverty line. The analysis indicates that the highest incidence of poverty was recorded for the city of Awassa, followed by Addis Ababa, Dessie, Mekelle, Jimma, Bahir Dar, and Dire Dawa.

Tadesse (1999) (as cited by Tesfaye (2006)) analyzed the determinants of poverty using the 1994, 1995 and 1997 rounds of the Ethiopian Urban Household Survey. The measure of welfare used in the study was ~~consumption per adult equivalent while the estimate of the poverty line was~~ obtained following the cost of basic needs approach. Thus, a consumption basket that would meet a minimum energy requirement of 2200 calories of energy per adult per day was constructed and its cost calculated at region specific prices to obtain the food poverty line. Then the total poverty line was obtained by dividing the food poverty line by the average food budget share of households in the neighborhood of the food poverty line. The analysis in Tadesse (1999) indicated an increase in poverty 1994 and 1995 and then a decrease from 1995 to 1997.

Tesfaye (2006) has analyzed the poverty status of urban households in Ethiopia based on the 1994 and 2000 household survey data obtained from the Ethiopian Urban Household Survey conducted by the Department of Economics, Addis Ababa University in collaboration with the Department of Economics, Goteborg University. The seven towns included by Tadesse are also included here. Aggregate household consumption expenditure (on food

and non- foods items) was converted in to per adult equivalent measure to adjust for the household size and composition. Then after identifying the size of the household in terms of number of adult equivalents, total consumption of the households is divided by the number of adults to get consumption per adult equivalent. Then a poverty line obtained for urban Ethiopia by Tadesse (1999) was adopted and the consumer price index (CPI) used to deflate the nominal values of the expenditure. Following the above procedures the incidence, poverty gap and severity of poverty in Addis Ababa was (0.446, 0.186, and 0.101) in 1994, and (0.433 .0176, 0.09) in 2000, respectively. Even though, the above studies were taken as empirical evidences, the sample size was small compared to the coverage of the study. Moreover, it is difficult to give general conclusion about the population from such sample size.

CHAPTER THREE

METHDOLOGY AND DATA SOURCE

3.1. Data Source

This study is based on the 2004/05 household income consumption expenditure survey (HICES) and the 2004 welfare monitoring survey (WMS) conducted by the Central Statistics Agency (CSA). According to CSA survey design report, HICE survey was designed to assess the level, extent and distribution of income dimension of poverty. It provides information on the level, distribution and pattern of household expenditure that can be used for analysis of changes in the living standard (poverty status) of households over time for various socioeconomic groups and geographical areas. It provides information on the consumption of food and non-food item, household expenditure, payments, receipts and income, and household characteristics such as family composition, education and occupation.

The WMS was conducted mainly for assessing non-income dimensions of poverty such as education, health and vulnerability. It provides extensive information on different dimensions of poverty and deprivation such as access to education and health facilities, achievements in education and underling asset bases of the poor and on the opportunity available to households. WMS covers household that are covered by HICE plus additional households. Hence, HICE is a sub sample of WMS. While WMS covers administrative zones; HICES covers rural and urban regions and major urban areas.

The WMS collected information on 3,573 households in Addis Ababa, while the HICES gathered data from 3,463 households. In this study, these data are merged together and the analysis was done based on 3,462 households, which are covered by both surveys.

3.2. Construction of poverty Line

Setting the poverty line is the starting point of any poverty analysis and often is the most contentious. The method of determining the poverty line can greatly influence poverty profiles, which are the key to the formulation of poverty reduction policies. According to Kakwani (Kakwani, 2001 cited by Haji.R, 2004), the relative approach is not appropriate to measure poverty, particularly in developing countries, since our concern in developing countries is more with the absolute standard of living, to ensure that nobody in the society should have a standard of living that is below the cost of buying a basket of essential items that allows one to meet the absolute thresholds of satisfying certain basic needs. Moreover, the relative approach has many series drawbacks. The most severe criticism is that it may show a reduction in poverty when people's income may be falling all around, resulting in a fall of the standard of living of the poor as well as the non-poor. A reduction (increase) in poverty will materialize only if there is a change in the relative income distribution. A poverty measure based on a relative approach is, in fact, a measure of inequality and thus we should instead look at various measure of inequality. Under the relative approach, poverty is completely insensitive to economic growth if the inequality of income does not improve. The only way to reduce poverty will be to reduce inequality.

Thus, this study is based on the concept of absolute poverty applying cost of basic need (CBN) approach. This approach defines poverty lines as the cost that has to be incurred to attain bundle of goods which are considered sufficient to meet basic consumption needs. Two steps have to be undertaken to construct poverty line by using this method.

1. The food poverty line, which is the cost sufficient to get consumption bundle adequate to meet the predetermined food energy requirement, has to be constructed.

2. Allowance for basic non-food consumption has to be made and the sum of food Poverty line and allowance for non-food consumption will make up total poverty line.

In this study, the food poverty line is constructed as follows: The average quantities of food items that are frequently consumed by the lowest 50 percent of the expenditure distribution of the sample households are identified. Then this typical food bundles are converted into calorie consumption and then scaled up to meet the predetermined minimum nutritional requirement (2,200 cal) per day per adult. After the bundle of food items which provide the predetermined level of energy to normal physical activities are identified, the bundle of food items are valued at their prices that prevailed in the specific areas at the time of the survey. By doing so, we estimate the food poverty line. The subsequent step is usually to estimate the non-food component of the total poverty line. In the case of food basket described above, most practices use the nutritional level to provide an objective criterion for what is considered a minimum. There is usually no such anchor available for non-food items. It is not very common to determine the quantities and prices of the items in the basket, as they are highly dependent on external recommendations from experts (it is a subject to high degree of debate). The most commonly used approach for drawing the non-food poverty line is based on the proportion expenditure devoted for food for a reference group of population. The approach consists in multiplying the inverse of this coefficient by the cost of the food basket, such that the non-food basket is directly obtained from the consumption habits of the reference population. This methodology is based on the original work done by Mollie Orshansky when drawing the U.S. poverty line; it is some times referred to as the Orshansky multiplier.

Applying this procedure has several conceptual implications. First, it assumes that “the households that satisfy their basic nutritional needs are satisfying, at the same time, the minimum standards of the other basic needs”, some thing

that is not necessarily sustained by empirical evidence (Frees, 1997 as cited by Qureshi, 2001). Put differently, individuals who have satisfied their nutritional needs might not necessarily satisfy their other basic needs. Secondly, Streeten (Streeten, 1989 as cited by Haji, 2004) points out that “there may be inconsistency in this way of arriving at poverty line. The minimum food requirements are derived normatively, by calculating how much the minimum requirements would cost; while the non-food items are determined by observing how much people actually spend. In order to remove the inconsistency, we would have to assume that what people actually happen to spend is what they need to spend on non-food items, a clearly unrealistic assumption.”

In practice, there are numerous options for applying the described methodology, including the following:

- Use of a single value for total non-food expenditures or different values for each non-food category.
- Use of the same reference group for the selection of the food basket or a different reference group. The former option uses the non-food consumption habits of the reference group identified as satisfying their nutritional requirements. It is also possible to select another reference group for the construction of the non-food poverty line, such as households with a level of food expenditure close to the food poverty line.
- Use of a range of non-food poverty lines. Under this option, lower and upper bounds are calculated for the non-food poverty line, as explained in Ravallion (1998). The lower bound is given by the expenditure on non-food items of households with a total expenditure approximately equal to the food poverty line. The upper bound is given by the expenditure on non-food items of households whose food

expenditure approximately equal to the food poverty line. Moreover, those households that satisfy the food poverty line with only food expense will have greater non-food expense than those households whose total expenditure is approximately equal to the food poverty line. The most popular method for Orshansky (1965) is simply to go straight to an estimate of the total poverty line by dividing the food poverty line by the share of food in the total expenditures. The intuition behind this is as follows. The larger the food share in the total expenditure, the closer the food poverty line should be to the total poverty line. The problem of which food share to use is of course an important issue. It is a problem analogous to the one discussed above on what the food basket should be for computing the food poverty line. Popular practice varies, but often makes use of:

1. The average food shares of those households whose total expenditure equal to the food poverty line;
2. The average food share of those households whose food expenditures equal to the food poverty line;
3. The average food share of a bottom proportion of the population (commonly households in the lower half of the expenditure distribution);

From the above alternatives, we can see that the total poverty line according to method (1) is smaller than other methods. It is obvious that those households whose total expenditure satisfies only food poverty line are more inclined on food expenditure, and the share of food is relatively large in such groups. Thus, dividing the food poverty line with such quantity is close to food poverty line. The food share of method (2) is smaller than the other methods since those households who satisfy food poverty with only food expense have better income compared to those reference populations in method (1) and method (3). So, dividing food poverty line with the food shares of this

population is greater than the value obtained applying share of foods in (1) and (3). The value obtained using method (3) is expected to be in between the others two methods. Therefore, due to the subjective nature of non-food poverty line, the method that we employed for setting of total poverty line should be decided among the above alternatives and taking in to account the expense patterns of the residences of Addis Ababa using the information from the data.

3.3. Logistic regression model

This study utilizes the logit model to analyze poverty status of households in Addis Ababa. This model is appropriate when the response variable is dichotomous (binary) or categorical. The specification of the logit model is:

$$E(Y_i | X_i) = \frac{1}{1 + e^{-X_i\beta}} = \frac{e^{X_i\beta}}{1 + e^{X_i\beta}} = F(X_i\beta) \dots\dots\dots (1)$$

where $E(Y_i | X_i) = P_i = prob(Y_i = 1 / X_i)$ is the response probability, i.e., the probability that i^{th} household will be poor given the individual characteristics of the household X_i , and $F(\cdot)$ is the logistic distribution function.

The non-response probability is:

$$\begin{aligned} P(Y_i = 0 / X_i) &= 1 - P_i = \frac{1}{\exp(X_i\beta)} \\ \Rightarrow \frac{P_i}{1 - P_i} &= \frac{\exp(X_i\beta) / 1 + \exp(X_i\beta)}{1 / 1 + \exp(X_i\beta)} = \exp(X_i\beta) \\ \Rightarrow \ln\left(\frac{P_i}{1 - P_i}\right) &= X_i\beta \dots\dots\dots (2) \end{aligned}$$

The ratio: $\frac{P_i}{1-P_i}$ is called odds, and $\ln\left(\frac{P_i}{1-P_i}\right)$ is called log odds or logit,

which acts as the dependent variable. The special features of this model are:

1. The mathematics of the model guarantees that probabilities estimated from the logit model will always lie within the logical bounds of 0 and 1.
2. Unlike the linear probability model, the probability of being poor does not increase linearly (by a constant amount) for a unit change in the values of the explanatory variables. Rather the probability approaches to zero at slower and slower rate, as the value of an explanatory variable gets smaller and smaller and the probability approaches 1 at a slower rate as the value of the explanatory variable gets larger and larger.
3. The significance of testing of the β weights rest upon the assumption that the errors of the prediction are normally distributed. Since Y only takes the values 0 and 1, this assumption is pretty hard to justify for a linear model. There, the test of the regression weights is suspect if we use linear regression with binary dummy variable.

3.4. Estimation of the logit model

Given a particular model, we have to estimate the unknown parameters and obtain some measure of accuracy with which we have estimated them. Estimation proceeds by defining a measure of goodness of fit between the data and a corresponding set of fitted values generated by the model, and choosing the appropriate parameter estimates as those that minimize the chosen goodness of fit criterion (Agresti,1996). From equation (2), above, it seems that it can be estimated with the usual ordinary least square method. Unfortunately, this is not the case because to apply ordinary least square to equation (2) we must know the value of the dependent

variable $\log\left[\frac{P_i}{(1-P_i)}\right]$, which obviously is not known. In fact, our ultimate objective is to find out what P_i is given the value of the explanatory variables. Let Y_i be a random variable which can take on the value 1 with probability P_i (called probability of success), and the value 0 with probability $(1-P_i)$. If the observations are independent, then the probability distribution of Y_i is given by:

$$\text{Pr ob}(Y_i = y_i) = P_i^{y_i} (1-P_i)^{1-y_i} \quad i = 1, 2, \dots, n \quad (1)$$

we have seen earlier that:

$$\text{Pr ob}(Y_i = 1 / X_i) = F(X_i \beta) \text{ and } \text{Pr ob}(Y_i = 0 / X_i) = 1 - F(X_i \beta)$$

Thus, each observation Y_i may be draw from a Bernoulli distribution with probability of success ($Y_i = 1$) equal to $F(X_i \beta)$ and the probability of failure ($Y_i = 0$) equal to $1 - F(X_i \beta)$. Using (1), the probability distribution of Y_i is given by:

$$\text{Pr ob}(Y_i = y_i / X_i) = [F(X_i \beta)]^{y_i} [1 - F(X_i \beta)]^{1-y_i} \quad i = 1, 2, \dots, n$$

The likelihood function is thus:

$$\begin{aligned} L &= \text{prob}(Y_1 = y_1, Y_2 = y_2, \dots, Y_n = y_n / X) \\ &= \text{Pr ob}(Y_1 = y_1) \times \text{prob}(Y_2 = y_2) \times \dots \times \text{prob}(Y_n = y_n) \\ &= \prod_{i=1}^n [F(X_i \beta)]^{y_i} [1 - F(X_i \beta)]^{1-y_i} \end{aligned}$$

Taking natural logarithms, we get the log-likelihood function:

$$Ln(L) = \sum_{i=1}^n \{y_i \ln[F(X_i\beta)] + (1 - y_i) \ln[1 - F(X_i\beta)]\}$$

Taking the derivative with respect to β we have:

$$\frac{\partial Ln(L)}{\partial \beta} = \sum_{i=1}^n \left[\frac{y_i f_i}{F_i} + (1 - Y_i) \frac{-f_i}{(1 - F_i)} \right] X_i = 0 \quad (2)$$

where $F_i = F(X_i\beta)$ and $f_i = \frac{\partial F(X_i\beta)}{\partial \beta}$.

These equations are highly non-linear, and we need to apply numerical methods (numerical optimization) to obtain the solutions. If $F(X_i\beta)$ is the logistic distribution function, that is:

$$F(X_i\beta) = \frac{\exp(X_i\beta)}{1 + \exp(X_i\beta)}$$

then we have:

$$f_i = \frac{\partial F(X_i\beta)}{\partial \beta} = \frac{\exp(X_i\beta)}{[1 + \exp(X_i\beta)]^2}$$

and equation (2) becomes:

$$\begin{aligned} \frac{\partial Ln(L)}{\partial \beta} &= \sum_{i=1}^n \left[\frac{y_i}{1 + \exp(X_i\beta)} + (1 - y_i) \frac{-\exp(X_i\beta)}{1 + \exp(X_i\beta)} \right] X_i \\ &= \sum_{i=1}^n \left[y_i - \frac{\exp(X_i\beta)}{1 + \exp(X_i\beta)} \right] X_i = \sum_{i=1}^n [y_i - F(X_i\beta)] X_i = 0 \end{aligned} \quad (3)$$

Note that in the classical linear regression model we have $F(X_i\beta) = X_i\beta$ and equation (3) becomes: $\sum_{i=1}^n [y_i - X_i\beta] X_i = 0$ which are simply the normal equations.

Hence, through maximization of the above log likelihood function, we can theoretically estimate the parameter vector β . But the equation is non-linear in β , and as a result the estimators do not have a closed form expression. Therefore, the estimation can be performed using non-linear optimization procedures such as the Newton-Raphson method.

3.5. Statistical inference

As mentioned before, the logistic regression model helps to describe the effects of the predictors on a binary response. Statistical inference of the model parameters helps to judge the significance and magnitude of the effects.

We can test the significance of the effects of X on the binary response with the set of hypotheses:

$H_0: \beta = 0$ (the probability of being poor is independent of X).

$H_1: \beta \neq 0$ (the probability of being poor depends on X).

For large sample size, the Wald statistics $(Z^2) = \left[\frac{\beta}{se(\beta)} \right]^2$ has a Chi-square distribution with one degree of freedom. However, the Wald statistics, which divides the parameter estimate by its standard error and then square, takes the right tail Chi-squared probability above the observed value as its P -value. A second method uses the likelihood function through the ratio of two maximizations:

1. The maximum over the possible parameter values that assume the null hypothesis.

2. The maximum over the larger set of possible parameter values for the fitted model, permitting the null or the alternative hypothesis to be true.

Let L_1 denote the maximized value of the likelihood function for the fitted model, and let L_0 denote the maximized value for the simpler model, representing the null hypothesis. For instance, when the linear predictor is $\alpha + \beta x$ and the null hypothesis is $H_0: \beta = 0$, L_1 is the likelihood function calculated at the (α, β) combination for which the data would have been most likely; L_0 is the likelihood function calculated at the α value for which the data would have been most likely when $\beta = 0$. Then L_1 is always at least as large as L_0 , since L_0 refers to maximizing over a restricted set of the parameter values that yield L_1 .

The likelihood ratio test statistic equals:

$$-2 \log \left(\frac{L_0}{L_1} \right) = -2 [\log(L_0) - \log(L_1)]$$

This transformation of L_0 and L_1 yields a chi-squared statistic. *under* $H_0: \beta = 0$, it has a large sample chi-squared distribution with d.f = 1 (Agresti, 1996). For very large samples, the Wald and likelihood ratio have similar behavior. For sample sizes used in practice, the likelihood ratio test is usually more reliable than the Wald test.

3.6. Model Diagnostics

After describing and inference about the effects of predictors on binary response in logistic regression, it is customary to check whether a particular model is appropriate for the data or not. Fitting logistic regression model provides predicted probabilities that $Y_i = 1$. At each setting of the explanatory variables, one can multiply the predicted probability by the number of subjects to obtain a fixed count. The test of null hypothesis that the model holds compares the fitted and observed counts using a Pearson's (X^2) or likelihood ratio test Statistic (G^2) . For a fixed number of settings, when most fitted counts are greater or equal to five, (X^2) or (G^2) have approximately chi-squared distributions (Agresti, 1996). The large (X^2) or (G^2) values indicate lack of fit of the model, and the P-value is the right tail probability above the observed value. When the fit is poor, residuals and other diagnostic measures describe the influence of individual observations on the model fit and highlight reasons for the inadequacy (Agresti, 1996).

The X^2 and (G^2) test statistics are given by:

$$X^2 = \sum \left(\frac{(\text{observed} - \text{fitted})^2}{\text{fitted}} \right), \text{ and}$$

$$G^2 = 2 \sum Y_i \log \left(\frac{\text{observed}}{\text{fitted}} \right)$$

$$= -2 \ln \left\{ \frac{LLC}{LLS} \right\}$$

where LLC = maximum likelihood of constant model

LLS = maximum likelihood of saturated model.

A constant model is a model that contains only the constant term, while a saturated model is a model that contains all factors selected by stepwise procedure. It is important to examine the adequacy of the resulting model in logistic regression. There are comparable diagnostics that should be used to identify data problems. The logistic regression provides a variety of such statistics. The residual is the difference between the observed probability and the predicted probability of the event based on the model. It can be viewed as a component of $-2LL(-2\log\text{likelihood})$ which compares model to the perfect model.

For each case, the deviance compares the predicted probability of being in the correct group based on the model to the predictor of $P(Y_i = 1)$

$$\text{Deviance} = \left[-2 \log \left(\frac{L_0}{L_1} \right) \right]$$

where L_1 is always 1, since the likelihood function of the correct prediction in a perfect model is 1, and L_0 is the predicted probability of membership in the correct group. Large values for deviance indicate that the model does not fit well, and for large sample sizes the deviance is approximately normally distributed (Agresti, 1996).

The goodness of fit of the logistic regression model can also be assessed using a classification table. The classification table for the response variable gives four readings with a 2 by 2 table for the observed and predicted values of the binary response. The diagonal entries are those cases that are correctly classified and the off diagonal entries are those incorrectly classified.

3.7. Model variables

Dependent variable

Poverty status of the household (POV): households classified into two groups based on the annual adult equivalent expenditure that satisfies the minimal requirement for a particular household.

POV = 1, households who are classified as poor (households who do not satisfy minimal basic requirement), and

POV = 0, otherwise.

Independent variables:

Household size (**HHSIZE**): household size is one of the possible determining factors for the households to be poor or non-poor. It is expected those households with large family sizes being more exposed to poverty. Households are categorized into three groups based on their size:

HHSIZE1 = 1, if the family size of the house hold is greater or equal to 6

HHSIZE2 = 2, if the family size of the household is 3-5, and

HHSIZE3 = 3, if the family size of the household is 1-2

Age (**AGE**): the age of the household head is one the possible factors that determine the poverty status of households. This variable is coded as:

AGE1 = 1, if the age of the household head is greater or equal to 46, and

AGE = 2, if the age of the household head is 13-45

Sex of the household head (**FEMALE**): it is expected that households with female household heads are more exposed to poverty since educational and

job participation of females is lower than that of males in general. Sex is coded as:

FEMALE = 1, household is female household head, and

MALE = 2, if the household is male headed

Marital status of the household head (**MARS**): marital status is one of the possible factors that determine the poverty status of households. And it is expected that married heads are more exposed to poverty, since they are responsible for unproductive children. This variable is coded as:

MARS1 = 1, if the household head is never married

MARS2 = 2, if the household head is currently married

MARS3 = 3, if the household head is divorced

MARS4 = 4, if the household head is separated, and

MARS5 = 5, if the household head is widowed

Health status of the households (**ILHM**): Unhealthy individuals in the household could not be competent in their work as healthy persons to escape from poverty and the medical expense may aggravate the situation. Health status is coded as:

ILHM1 = 1, households with any ill member, and

ILHM2 = 2, otherwise

Ownership of house (**OWNH**): housing is one of the possible factors to determine the poverty status of households in Addis Ababa, and it is expected that households who do not have their own house are more vulnerable to poverty. Ownership is coded as:

OWNH1 (GOV) = 1, households rented from Government rent agencies and other NGOs

OWNH = 2, households rented from Kebele

OWNH3 (PRIV) = 3, households rented from private house renters

OWNH4 (FRE) = 4, households with free (charges or subsidized) from employers or relatives, and

OWNH5 (OW) = 5, households who have own house

Ownership of tap water inside the compound (**OWNTPW**): ownership of tap water (pure water) inside the compound is one of the possible factors that indicate the poverty status of households, since it minimizes time and labor which is wasted to bring water from other place. Also the accessibility of pure water determines the health status of households. This variable is coded as:

OWNTPW1 = 1, households who have own tap water inside the compound and

OWNTPW2 = 0, otherwise

EDUCATION: Educational status of the household head is one of the possible factors that determine the poverty status of households. And it is expected that households with better educational status will have a better job opportunity to earn good income relatively. The educational status of heads of households is divided into four categories:

EDUCATION1 (ILL) = 1, if the households head is illiterate

EDUCATION2 (PRI) = 2, if the household head is (KG-Grade6)

EDUCATION3 (HIG) = 3, if the household head is grade (7-12), and

EDUCATION4 (HED) = 4, if the household has higher education

EMPLOYMENT: This variable is coded as:

EMPLOY1 (UNF) = 1, if the household head is unpaid family worker

EMPLOY2 (SELF) = 2, if the household head is self employed

EMPLOY3 (PRIV) = 3, if the household head is private employed

EMPLOY4 (PUBGOV) = 4, if the household head is government or public
employed, and

EMPLOY5 (NGO) = 5, if the household head is NGO worker

INCOME: The expenditure of households clearly depends on the source of income of the given household. Income source is coded as:

INCOME1 (HDEN) = 1, if the household's income is from household
enterprise

INCOME2 (GIFGON) = 2, if the household's income is gift and remittances
from government, NGOs and other households.

INCOME3 (WAG) = 3, households whose source of income is wage
and salary

INCOME4 (PEN) = 4, households whose source of income is pension
and other social security

INCOME5 (HDREN) = 5, households whose source of income from
house renting and other current transfers

INCOME6 (REMAB) = 6, if households whose source of income is gift
and remittances from Abroad

RESIDENCES: Sub cities are categorized into five groups based on the extent and closeness of poverty status using the result from bivariate analysis. This variable is coded as:

RESIDENCE1 (ADKET) = 1, if the households in Addis Ketema sub city

RESIDENCE2 (LIDARA) = 2, if the house holds in Lideta or Arada sub city

RESIDENCE3 (AKLAF) = 3, if the house holds in Akaki Kaliti or Nefas
silk Lafto sub city

RESIDENCE4 (GULKIKOY) = 4, if the households in Gulele, Kirkos, Kolfe
keranio or Yeka sub city and

RESIDENCE5 (BOL) = 5, if the households in Bole sub city

CHAPTER FOUR

DISCUSSION AND RESULTS

4.1. Identifying poverty line and the poor

As already explained in chapter three, there are two methods of absolute poverty line setting; food energy intake (FEI) approach and cost of basic needs approach (CBN). Among the above two method, costs of basic needs approach is employed for this study. Since the FEI approach focuses only on the food bundles of a population that satisfy the minimum reasonable diet as cut off point for the poverty line. Moreover, this method is mostly adopted for rural population considering that the non-food expense compared to the food expense is minimal. However, in the case of Addis Ababa, the non- food expense is considerable (considering the over all average non-food expenditure shares of Addis Ababa's residents, 65%). In addition, it helps to compare poverty situation across time because of its monetary representation. The following procedures are followed for the given method:

1. Food poverty line: for this purpose, the first step is selecting the reference group or population. That is converting the households' size into adult equivalents, which is based on age, sex and their corresponding calorie requirements, which is given in Appendix A. The recommended daily calorie requirement (intake) for an adult aged between 30 and 60 is 2,200 calories. This category is assumed to carry the weight equal to 1 (one). The calorie requirement for different age groups and sexes are obtained by multiplying 2,200 with their corresponding weights to obtain the total calorie required within in the given household. Then the calorie requirement for all individuals within households was added and divided by 2,200 to represent the household size in terms of adult equivalents. The total expenditure (food expenditure sum + non- food expenditure sum) divided by the number of adult equivalent within households reflects the total consumption expenditure per adult

equivalent for a particular household within a year. Based on this result households are arranged in ascending order. For setting the representative diet, first the average quantities of the various food items consumed by households in the lower half of the expenditure distribution during the survey period are estimated. Then 243 food items and 20 bundles of foods (food groups) were selected to set representative diet normally consumed by households in the lower half of the expenditure distribution. In the analysis, unit values for each food items were calculated by dividing total expenditure for each item by their corresponding total quantity. This value refers to the price paid by the reference population for each food item. In this analysis, all food items consumed by the reference population are included. The median unit values (prices) were calculated for each food item rather than the mean to mute the effect of extreme values. To find the mean value, which is the mean kilocalorie per kilogram (MKcal/kg) and the mean price per kilogram (Mprice/kg) for each 20 food groups, the weighted mean is adopted since the quantity of each item, vary for each food groups. These means are calculated as follows:

$$\text{Mkcal/kg} = \sum_{i=1}^{n_i} P_i C_i$$

$$\text{Mprice/kg} = \sum_{i=1}^{n_i} P_i PR_i$$

where P_i = the proportion of i^{th} food item from the total quantity

for each food group.

C_i = the amount of calories obtained from i^{th} food item

per kilogram for each food group.

PR_i = the median price of i^{th} food item per kilogram for

each food group.

n_i = the number of food items for each food group.

The calorie share of each food group consumed by households in the lower half of the expenditure distribution is calculated by dividing the total calories obtained from each food groups with total calories of all 20-food bundles (food groups). And the share of calories needed to get 2200 calories per adult per day was adjusted based on the calorie share of each food group. Then the value of poverty line per year per adult for each food groups is obtained by multiplying the price of calories needed to get 2200 calories for each food groups with 365 (number of days per year). Following the above steps, the value of food poverty line per adult per year is calculated to be 1115.67 Birr (see table 1), which is the sum of the price of calories needed for 20 food bundles per year per adult.

2. Total poverty line: The subsequent step is estimating the non-food component of poverty line. As explained in chapter three, setting the non-food poverty line is not as objective as the food poverty line. However, the most popular method is division rule (Orshasky, 1965, Ravallion and Bidani, 1994). Under this method, three common ways of division rules are familiar. These are dividing the food poverty line by:

- A. The food shares of the reference population.
- B. The food shares of households whose total expenditure is equal to the food poverty line.
- C. The food shares of households whose food expenditure is equal to the food poverty line.

Table.1: Diet of the households in the lower half of expenditure distribution
in Addis Ababa From 2004/05 HICES (weighted)

Food group	Mean Kcal/kg	Mean price(Birr)/kg	Calorie share (%)	Calorie needed to get 2200calorie	Value of food poverty line per year (Birr)
Cereals unmilled	3.64	2.02	10.00	220	44.56
Cereals milled	3.61	2.17	56.23	1237.06	271.42
Pulses unmilled	3.6	2.10	2.12	46.64	9.93
Pulses milled1(kik)	3.53	4.14	3.53	77.66	33.244
Pulses milled2(shiro)	3.56	4.29	2.40	52.80	23.224
Oil seeds	5.19	3.16	0.047	1.034	0.3
Cereal preparations	2.77	4.68	0.54	11.88	7.33
Meat	1.32	9.70	1.68	36.96	99.134
Fish	1.27	21.10	0.00097	0.021	0.13
Bread and other prepared foods	1.4	4.35	8.63	189.86	215.322
Milk,cheese and eggs	0.68	2.72	0.3	6.60	9.636
Oils and fats	4.3	9.84	5.21	114.62	95.74
Vegetables	0.6	1.83	2.33	51.26	57.065
Fruits	0.6	1.90	0.0095	0.21	0.243
Spices	0.88	9.60	0.63	13.86	55.188
Potato and other tubers	0.47	0.89	1.18	25.96	17.95
Coffee, tea and buck thorn leaves	1.63	9.16	0.77	16.94	34.75
Salt and sugars	0.3	4.03	0.41	9.02	44.23
Food taken away from home	1.87	5.55	2.80	61.6	66.73
Others	1.7	5.30	1.18	25.9	29.54
Total				2200	1115.667

Source: own calculation from the 2004/05 HICE

Note: The calorie obtained from each food item is obtained from CSA and Ethiopian Health and Nutrition Research Institute.

In this analysis, the first method was employed since the data indicates that this method reflects the non-food expenditure patterns of the residences in the city better. The second method is appropriate for rural poverty analysis, since the food shares of those households whose total expenditure is equal to the food poverty line is higher compared to non-food share (57% in our case). Therefore, dividing the food poverty line by such share is more inclined to the food poverty line. The third method is appropriate in developed and medium income countries since it is more inclined to non-food expense (food shares of these households in our case is 35%). Dividing the food poverty line with the food shares of these households tend to exaggerate the total poverty line. Taking into account the above facts, the first method is used to estimate the total poverty line. And the over all average food share of the reference population is 0.53 (802.12 Birr for food and 712 .74 Birr for non- food). Thus, the total poverty line is $1115.67/0.53 = 2105.04$ Birr. Then the poverty indices were calculated as follows:

$$P_0 = \frac{q}{N} = \frac{1415}{3462} = 0.4087$$

$$P_1 = \frac{1}{3462} \sum_{i=1}^q \left[\frac{(Z - Y_i)}{Z} \right] = 0.15$$

$$P_2 = \frac{1}{3462} \sum_{i=1}^q \left[\frac{(Z - Y_i)}{Z} \right]^2 = 0.07$$

where $Z = 2105.04$

q = the number of poor households whose total expenditure
per adult equivalent is less than total poverty line.

Y_i = is the income of the poor which is less than 2105.04

per adult equivalent per households.

The above finding tells us that 40.87% of Addis Ababa's residents are below poverty line. That is, such proportions of Addis Ababa's residents failed to satisfy their minimum requirement during the survey period. The depth and severity of poverty are 0.15 and 0.07, respectively. The depth of poverty (poverty deficient) reflects the total deficiency of all poor households relative to the poverty line (Ravallion and Bidani, 1994). It is a much powerful measure than the head count ratio because it takes into account the distribution of the poor below the poverty line. It also reflects the per capita cost of eliminating poverty. An over all poverty depth of 0.15 means that if the region could mobilize resources equal to the number of people below the poverty line times 15% of the poverty line, and distribute these resources to the poor in the amount needed to bring each individual to the poverty line, then nobody would be below the poverty line. Moreover, the poverty severity of 0.07 indicates that the inequality within the poor is not that much exaggerated. The depth of poverty (P_1) refers to how far below the poverty line the poor are on average, while severity (P_2) is a measure of relative deprivation among the poor. This means, the depth of poverty reflects the over all average expenditure distance of the poor below the poverty line, while severity of poverty reflects inequality within the poor. In addition, the percentage of population below the food poverty line is 13.72. This implies that 13.72% of Addis Ababa's residents could not satisfy even the reasonable diet let alone the non-food expense. On the other hand, the over all average food expense of the residents is 3282 Birr per adult per year. Considering the over all average food expense of those households in the lower half of the expenditure distribution, the corresponding result gives 1514.85 Birr per adult equivalent.

4.2. Bivariate Analysis

Preliminary test was done to determine whether the explanatory variables have statistically significant association with poverty status of households or not. For each one of the independent variables, a test of association was carried out using Pearson chi-square (X^2) and change in deviance (G^2). The change in deviance is obtained by including a single independent variable in the logit model and comparing the change in deviance with reference to the intercept only model. The results are given on Table 2.A. and Table 2.B.

Table 2.A. Bivariate Association of selected variables and poverty status of households in Addis Ababa

Variables	Pearson Chi square	D. f	p-value
Place of residence	98.398	4	0.000
Household size	544.260	2	0.000
Sex	7.091	1	0.008
Age	103.162	1	0.000
Educational status	308.124	3	0.000
Marital Status	121.752	4	0.000
Employment status	42.442	4	0.000
Ownership of house	248.636	4	0.000
Source of drinking water	48.190	1	0.000
Income source	34.829	5	0.000
Health situation	10.296	1	0.000

Table 2. B. Significance of change in deviance due to entering a single variable in a model with intercept model.

Variables	Change in deviance	D.f	P- value
Place of residence	100.686	4	0.000
Household size	586.580	2	0.000
Income source	34.995	5	0.000
Sex	7.074	1	0.008
Age	103.282	1	0.000
Education	325.725	3	0.000
Marital status	132.706	4	0.000
Employment status	42.880	4	0.000
Ownership of house	252.030	4	0.000
Ownership of tap water inside the compound	47.171	1	0.000
Health situation	10.287	1	0.001

Household Size and Poverty status of households: large household sizes tend to associate with poverty. This is because the effect of household size on household wellbeing depends on consumptions among household members. The bivariate result showed that from those with family size (1-2) only 2.6% of them are under poverty line and from those with family size 3-5, 30.3% of them are below poverty line. From those with family sizes greater or equal to 6, 63.6% of them are below poverty line. The result indicates that family size is one of the basic factors that determine the poverty status of households.

Age and poverty: there are two different opinions about the relation between poverty and age. Some argue that as age increases the probability of accumulation of assets also increases and this helps the households to escape from poverty. On the other hand, others argue that when the household heads becomes old, their productiveness decreases and households become more vulnerable to poverty. The bivariate result showed that 29.7% of households whose heads age between 13 and 45, and 49.1% of households whose heads age greater or equal to 46 are below poverty line. This tends to support the second opinion that as age of the household heads increases, their

productiveness decreases, and consequently the probability of being poor increases.

Sex and poverty: the bivariate result showed that 36.6% of male headed and 41.5% of female headed are below poverty line. This indicates that female-headed households are more exposed to poverty. The incidence may be due to less educational and job opportunity for females compared to that of males.

Housing and poverty: housing is one of the critical problems in Addis Ababa. The bivariate analysis showed that 20.8% of households who are renting from government agencies and NGO agencies and 57.4% of households who are renting from kebele are below poverty line. Similarly, 19.3% households who are renting from private house renters, 24.3% households who are living with free charge from employers and relatives and 34.9% of households who have their own house are below poverty line. The result showed that ownership of house is not a guarantee to escape from poverty. More over households who rent their house from Kebele are more vulnerable to poverty compared to the others.

Marital status and poverty: marital status is one the possible determinants of poverty status. And it is expected that when people get married household size will increase as new children are born and expenditure increase which in turn leads searching for mechanisms of fulfilling additional needs and necessities for the family. The bivariate result showed that 29.7% of currently married, 42.5% of never married, 35.5% of divorced, 45.5% of separated and 12.5% of widowed are below poverty line. The above finding indicates that unmarried heads are more vulnerable to poverty than that of married except widowed.

Health status and poverty: it seems obvious that the health status of household members is one of the determinants of households' income since unhealthy individuals do not normally expected to be as competent on their

work as that of healthy ones. In addition, the treatment expense hurts the actual income of the family. Descriptive statistics showed that 44.5% of households with at least one member of the family ill and 37.0% of those households with no member of the family ill are below poverty line.

Education and Poverty: education increases the level of human capital and this in turn increases labor productivity and wages. Since labor is the most important asset of the poor, increasing education of the poor will tend to reduce poverty. The result showed that 51.5% illiterate headed, 52.5% households with Kindergarten up to grade 6 qualified headed, 24.8% households with grade 7 up to 12 qualified headed and 9% higher education qualified headed are below poverty line.

Employment category and poverty: identifying the extent of problems with respect to the employment category is important. The bivariate result showed that 45.2% unpaid family workers headed, 39.4% of self-employed headed, 30.4% of government or public employed headed and 18% NGO employed headed households are below poverty line. It indicates that unpaid family workers headed households are more vulnerable to poverty in contrast to NGO workers headed households.

Income source and poverty: source of income is one of the possible factors that determine the poverty status of households. The bivariate result showed that 41.7% of households whose source of income is own agriculture and household enterprise other than agriculture and 42.2% of households whose source of income is gift from government, NGOs and other households are below poverty line. Similarly, 33.8% of households whose source of income are wages and salaries, 48.2% of households whose source of income is pension, and 27.4% of households whose source of income are gift and remittances from abroad are below poverty line. This indicates that

households whose source of income is pension are more vulnerable to poverty in contrast to those whose income source is remittances from abroad.

Location and poverty: identifying the location of the poor (residents of the poorest relative to the others location) is important to experts and responsible officials to allocate appropriate budget taking into account the depth of poverty in the given location. The bivariate result showed that 54.8% of Addis ketema, 45.4% of Lideta or Arada, 42.2% of Akaki kaliti or Nefasilk Lafto, 32.7% of Gulele, Kirkos, kolfe keranio or Yeka and 19.7% of Bole sub city residents are below poverty line. The above result indicates that Addis ketema's residents are more vulnerable to poverty in contrast to Bole.

4.3. Multivariate analysis

To determine factors that are significantly correlated with poverty status, the preliminary assessment was done using chi-square and change of deviance test of statistics (see Tables 2.A. and 2.B.). Variables selected for multivariate analysis using logistic regression are those that are strongly associated with poverty status of the households. The forward stepwise selection method was used with 0.05 level of significance for entry and 0.1 level of significance for the removal of variables from the model. Household size (HHSIZE), place of residences (RESIDENCES), source of income (INCOME), ownership of house (OWNH), educational status of head (EDUCATION), employment status of head (EMPLOY STATUS) and ownership of tap water inside the compound (OWNTPW) are variables that passed this procedure for the final analysis.

4.3.1. Model diagnostics

Any fitted model should be assessed and diagnosed for model adequacies and reliabilities. In this study, the likelihood ratio test was used for checking model adequacy. The values of the likelihood ratio statistics for the constant model and for the fitted model were 4360.662 and 2878.143, respectively. The resulting model chi-square value is then 1482.52 (=4360.662-2878.143). This statistic is significant at the 1% level, indicating the good fit of the model.

The classification power for the poverty status indicates that 1672 non-poor households and 850 poor households are correctly classified. The model misclassified 751 households with 408 non-poor and 343 poor. That is 83.0 % of non-poor and 67.6 % of the poor are correctly classified. All in all 77.1 % of households are correctly classified (the results are shown in Table 3). The three influential measures, the cook’s distance, the leverage statistic and dfbeta indicated that there are no significant influential observations. Thus, we can conclude that the fit is good.

Table. 3.

Classification Table ^a					
Observed			Predicted		
			poverty status		Percentage Correct
			if the household is non-poor	if household poor	
Step 7	poverty status	if the household is non-poor	1672	343	83.0
		if household poor	408	850	67.6
	Overall Percentage				77.1

a. The cut value is .500

4.3.2. Interpretation of results

The results of logistic regression are presented in the Table, 4. The empirical result showed that all of the variables have the correct signs. The regression results confirm the indication from the bivariate analysis. The Wald statistics are large enough for most coefficients so that we can reject the null hypothesis ($\beta_j = 0$) at the conventional levels of significance. The parameter estimate (estimated β coefficient) associated with an explanatory variable is an estimate of the change in the logit (log odds) caused by a unit change in that explanatory variable. It is probably easier to use the multiplicative form of the equation using $\exp(\beta)$ for the interpretation of results for the fitted model. The odd ratio ($\exp(\beta)$) values greater than one indicate that the variables in the equation increase the odds of being poor. All odd ratios except one are greater than one since the reference categories for each variable were taken as those which are likely less probable to be poor based on the information from the bivariate analysis. This is for the simplicity of interpretation. From Table 4 we can see that the probability of being poor is high as family size increases. Households who have family size greater or equal to 6 are about 126 times more likely to be poor than those who have family size between 1 and 2. In addition, households whose family size is between 3 and 5 are about 20.4 times more likely to be poor than those who have family size is between 1 and 2. The result shows that severity of poverty increases in parallel with increment of family size and the importance of family planning for the struggle against poverty. The result based on location of residences also showed that, households living in Addis ketema, Lideta or Arada sub cities are about 1.6 times more likely to be poor than those who are living in Bole sub city. Households living in Akaki kaliti or Nefas silk lafto sub cities are about 2 times more likely to be poor than those who are living in Bole sub city. On the other hand the poverty status of households who are living in Gulele, kolfe keranio, Yeka and Kirkos sub cities is close to those who live in Bole sub city.

The result based on the source of income indicates that households whose source of income is gift (from government or NGOs or other households), and households whose source of income is from house renting are about three times more likely to be poor as compared to households remitted from abroad. Similarly, households whose source of income is pension and other social securities are about 2.6 times more likely to be poor than those households remitted from abroad. In addition, households whose source of income are wages and salaries are about 2 times more likely to be poor than households remitted from abroad.

The result based on the educational status of household heads showed that households who are illiterate headed, and those KG-grade 6 qualified headed are about 12 times more likely to be poor than households whose heads have higher education. Similarly, households from grade (7-12) qualified headed are about 3 times more likely to be poor than households who are higher education headed. ~~The result obtained from employment categories is also~~ impressive. It showed that households headed by unpaid family workers are about 4 times more likely to be poor than households whose heads worked in non- government organization. Moreover, private employed headed, self-employed headed and government or public employed headed households are about 3 times more likely to be poor than those who worked in non-government organization.

The result based on ownership of house showed that households who rent their house from kebele are about 4 times more likely to be poor than households who have their own house. In addition, households renting from private house renters and those who live free charge (from employers or relatives) are slightly poorer than those who have their own house. Finally, households who do not have their own tap water inside the compound are about 1.7 times more likely to be poor than those who have own tap water inside the compound.

Table. 4
Final fitted model using stepwise for ward selection

VARIABLES OF THE EQUATION							95% C.I for EXP (B)	
	B	S.E	Wald	df	Sig	EXP(B)	Lower	Upper
RESIDENCES			26.766	4	.000			
RESIDENCE1 (ADKET)	.498	.239	4.354	1	.037	1.646	1.031	2.628
RESIDENCE2 (LIDARA)	.490	.216	5.131	1	.024	1.632	1.068	2.495
RESIDENCE3 (AKLAF)	.689	.203	11.544	1	.001	1.991	1.338	2.963
RESIDENCE4 (GUKIKOY)	.145	.198	.540	1	.462	1.156	.785	1.703
RESIDENCE5 (BOL) Ref	-	-	-	-	-	-	-	-
HHSIZE			459.847	2	.000			
HHSIZE1	4.838	.297	266.175	1	.000	126.248	70.599	225.762
HHSIZE2	3.016	.288	109.910	1	.000	20.405	11.611	35.859
HHSIZE3 Ref	-	-	-	-	-	-	-	-
INCOME SOURCES			25.557	5	.000			
INCOME1(HDEN)	.504	.287	3.094	1	.079	1.656	.944	2.905
INCOME2 (GIFGON)	1.166	.320	13.282	1	.000	3.209	1.714	6.007
INCOME3(WAG)	.686	.279	6.062	1	.014	1.986	1.150	3.429
INCOME4 (PEN)	.949	.292	10.559	1	.001	2.583	1.457	4.578
INCOME5 (HDREN)	1.109	.300	13.644	1	.000	3.033	1.683	5.463
INCOME6(REMAB) Ref	-	-	-	-	-	-	-	-
EDUCATIONAL STATUS			223.535	3	.000			
EDUCATION1(ILL)	1.929	.358	29.081	1	.000	11.880	3.413	13.868
EDUCATION 2(PRI)	2.507	.212	140.260	1	.000	12.265	8.100	18.571
EDUCATION3 (HIG)	1.197	.212	31.772	1	.000	3.309	2.183	5.017
EDUCATION4(HED) R	-	-	-	-	-	-	-	-
EMPLOYMENT STATUS			9.813	4	.044			
EMPLOY1(UNF)	1.340	.471	8.105	1	.004	3.819	1.518	9.609

EMPLOY2 (SELF)	1.118	.469	5.685	1	.017	3.058	1.220	7.663
EMPLOY3 (PRIV)	1.216	.477	6.504	1	.011	3.374	1.325	8.592
EMPLOY4 (PUBGO)	1.156	.473	5.981	1	.014	3.176	1.258	8.020
EMPLOY5(NGO) Ref	-	-	-	-	-	-	-	-
OWNER SHIP OF HOUSE			135.156	4	.000			
OWNH1(GOVN)	-.078	.303	.066	1	.798	.925	.511	1.675
OWNH2 (KEB)	1.310	.119	121.273	1	.000	3.706	2.935	4.679
OWNH3 (PRIV)	.310	.153	4.119	1	.042	1.364	1.011	1.841
OWNH4 (FRE)	.223	.205	1.185	1	.276	1.249	.837	1.866
OWNH5 (OW) Ref	-	-	-	-	-	-	-	-
OWNTPW(1)	.535	.102	27.605	1	.000	1.707	1.399	2.085
Constant	-8.956	.665	181.169	1	.000	.000		

CHAPTER FIVE

5. Conclusions and policy Implications

Identifying the extent and factors that dominantly aggravate the poverty situation of the residents of Addis Ababa is the main objective of this analysis. In fact, identification of these factors, which are multidimensional and interrelated, is critical to come up with a concrete solution. However, it is difficult to bring a complete solution for the whole problem overnight, and prioritization of the variables (intervention areas) is important.

In general, the entire poverty situation during the survey period was critical in the city. The study indicates that allocating budget taking into account the depth of poverty in each sub city is recommended. According to the result, Addis ketema, Lideta, Arada, Akaki kaliti and Nefas silk lafto sub cities' residents are the most vulnerable to poverty. On the other hand, the extent of poverty for the residents of Bole sub city is relatively lower. This may be due to the fact that most capital investment in the city is established in Bole sub city and most residents of this sub city are those who have the potential to build their own house. Therefore, responsible bodies should take into account the living standard of residents during budget allocation in addition to other activities for the success of poverty reduction programs.

Household size was one of the dominant factors during the survey period in the city. The result indicates that households with large family size are more likely to fall into the hard-core section of poverty easily than those who have less family size. Thus, education about family planning should be provided by the concerned bodies.

The educational background of the heads of households is also one of the most important factors in Addis Ababa. Particularly college education have vital role in reducing poverty in Addis Ababa. Thus, this area needs special

attention for the ultimate reduction of poverty in the city. Housing is one of the main problems in the city. According to this study, households who rent their house from kebele are the most vulnerable to poverty. In addition, those who rent from private house renters are also the most exposed to poverty. Thus, Addis Ababa's housing development agency which is working on the construction of houses should focus on these households.

The result based on source of income indicates that households who depend on gifts, house renting and pension for their livelihood are the most exposed groups to poverty. Thus, these groups need further support, and job opportunities focusing on them should be created. On the other hand, households who lead their lives with remittances sent from abroad are less probable to be poor. This shows the role of remittances in poverty reduction. Finally, the availability of tap water inside the compound has also a significant role in determining the poverty situation of the residents. Thus, meaningful measures should be taken in this area since the availability of pure water has an indirect influence on the health status of the residents, which has a great impact on the productiveness of individuals.

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Appendix A: Nutrition (calorie) based équivalent scale

Age in years	Weight	
	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
30-50	1.0	0.82
60 plus	0.84	0.74

Source: Dercon and Krishnan (1998)

Appendix B: Percentage of food shares for households in the lower half
of expenditure distribution in Addis Ababa from 2004/05 HICES

Food group	Food share (%)
Cereals unmilled	4.28
Cereals milled	38.51
Pulses unmilled	1.40
Pulses milled1(kik)	2.47
Pulses milled2(shiro)	1.67
Oil seeds	.023
Cereals preparations	.48
Bread and other prepared foods	15.04
Meat	3.43
Fish	.002
Milk, cheese and egg	1.07
Vegetables	9.47
Fruits	.19
Spices	1.76
Potato and other tubers	6.1
Salt, sugar and others	5.58
Coffee, tea and buck thorn leaves	1.67
Food taken away from home and milling charges	3.81
Oil and fats	3.0
Total	100.0

Source: (own calculation)

Appendix C: Food shares of each food bundles from the total (aggregate)

food bundle in Addis Ababa from total food budget (2004/05) HICES.

Food group	Expenditure share (%)
Cereals	39.2
Pulses	5.6
Oil seeds	.017
Cereal preparations	.53
Bread and other prepared food	13.24
Meat	4.5
Fish	.0047
Milk, cheese and egg	1.56
Oils and fats	3.26
Vegetables and fruits	11.26
Spices	1.9
Potato and other tubers	5.73
Coffee, tea and buckthorn leaves	1.14
Salt, sugar and others	6.78
Food taken away from home and milling charges	4.86
Total	100.00

Source: own calculation from the 2004/05 HICES

Appendix D.

Dependent Variable Encoding

Original Value	Internal Value
if the household is non-poor	0
if household poor	1

Categorical Variables Codings

		Frequency	Parameter coding					
			(1)	(2)	(3)	(4)	(5)	(6)
Source of Income for the HH	from household enterprise	796	1.000	.000	.000	.000	.000	
	gift and remittances govt NGO and other households	230	.000	1.000	.000	.000	.000	
	Wages and salaries	1475	.000	.000	1.000	.000	.000	
	Pension and other social securities	363	.000	.000	.000	1.000	.000	
	from house renting and other current transfer	292	.000	.000	.000	.000	1.000	
	Remittances and gift from Abroad	117	.000	.000	.000	.000	.000	
place of residence (sub city)	Addis Ketema	310	1.000	.000	.000	.000		
	Lideta or Arada	593	.000	1.000	.000	.000		
	Akaki kaliti and Nefas silk Lafto	868	.000	.000	1.000	.000		
	Gulele Kirkos Kolfe keranio yeka	1208	.000	.000	.000	1.000		
	Bole	294	.000	.000	.000	.000		
Basis of the HH to occupy the dwelling unit now	rented from govt and NGO agencies	101	1.000	.000	.000	.000		
	rented from Kebele	1096	.000	1.000	.000	.000		
	rented from others	592	.000	.000	1.000	.000		
	Free from employers and relatives	222	.000	.000	.000	1.000		
	owned	1262	.000	.000	.000	.000		
Employment status	unpaid family workers and others	1105	1.000	.000	.000	.000		
	self employed	1124	.000	1.000	.000	.000		

	private employed	438	.000	.000	1.000	.000		
	Government or public service worker	556	.000	.000	.000	1.000		
	NGO worker	50	.000	.000	.000	.000		
Education	household head illiterate	66	1.000	.000	.000			
	Kindergarten - grade 6	1786	.000	1.000	.000			
	grade (7-12)	1022	.000	.000	1.000			
	higher education	399	.000	.000	.000			
Household Size	household sizes greater or equal to 6	1247	1.000	.000				
	house hold size (3-5)	1490	.000	1.000				
	household size (1-2)	536	.000	.000				
Source of drinking water	otherwise	1256	1.000					
	tap water inside the compound	2017	.000					

Appendix E.

place of residence (sub city) * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if househod poor	
place of residence (sub city)	Addis Ketema	Count	140	170	310
		% within place of residence (sub city)	45.2%	54.8%	100.0%
	Lideta or Arada	Count	324	269	593
		% within place of residence (sub city)	54.6%	45.4%	100.0%
	Akaki kaliti and Nefas silk Lafto	Count	502	366	868
		% within place of residence (sub city)	57.8%	42.2%	100.0%
	Gulele Kirkos Kolfe keranio yeka	Count	813	395	1208
		% within place of residence (sub city)	67.3%	32.7%	100.0%
	Bole	Count	236	58	294
		% within place of residence (sub city)	80.3%	19.7%	100.0%
Total		Count	2015	1258	3273
		% within place of residence (sub city)	61.6%	38.4%	100.0%

Household Size * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if househod poor	
Household Size	hhousehold size greater or equal to 6	Count	454	793	1247
		% within Household Size	36.4%	63.6%	100.0%
	house hold size (3-5)	Count	1039	451	1490
		% within Household Size	69.7%	30.3%	100.0%
	household size (1-2)	Count	522	14	536
		% within Household Size	97.4%	2.6%	100.0%
Total		Count	2015	1258	3273
		% within Household Size	61.6%	38.4%	100.0%

Appendix F.

Source of Income for the HH * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if household poor	
Source of Income for the HH	from household enterprise	Count	464	332	796
		% within Source of Income for the HH	58.3%	41.7%	100.0%
	gift and remittances govt NGO and other households	Count	133	97	230
		% within Source of Income for the HH	57.8%	42.2%	100.0%
	Wages and salaries	Count	976	499	1475
		% within Source of Income for the HH	66.2%	33.8%	100.0%
	Pension and other social securities	Count	188	175	363
		% within Source of Income for the HH	51.8%	48.2%	100.0%
	from house renting and other current transfer	Count	169	123	292
		% within Source of Income for the HH	57.9%	42.1%	100.0%
	Remittances and gift from Abroad	Count	85	32	117
		% within Source of Income for the HH	72.6%	27.4%	100.0%
Total		Count	2015	1258	3273
		% within Source of Income for the HH	61.6%	38.4%	100.0%

Appendix G.

Sex * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if househod poor	
Sex	Female	Count	731	518	1249
		% within Sex	58.5%	41.5%	100.0%
	male	Count	1284	740	2024
		% within Sex	63.4%	36.6%	100.0%
Total		Count	2015	1258	3273
		% within Sex	61.6%	38.4%	100.0%

Age * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if househod poor	
Age	age greater than or equal to 46	Count	754	726	1480
		% within Age	50.9%	49.1%	100.0%
	age (13 -45)	Count	1261	532	1793
		% within Age	70.3%	29.7%	100.0%
Total		Count	2015	1258	3273
		% within Age	61.6%	38.4%	100.0%

Appendix H.

Education * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if household poor	
Education	household head illiterate	Count	32	34	66
		% within Education	48.5%	51.5%	100.0%
	Kindergarten - grade 6	Count	851	935	1786
		% within Education	47.6%	52.4%	100.0%
	grade (7-12)	Count	769	253	1022
		% within Education	75.2%	24.8%	100.0%
	higher education	Count	363	36	399
		% within Education	91.0%	9.0%	100.0%
Total	Count	2015	1258	3273	
	% within Education	61.6%	38.4%	100.0%	

Employment status * poverty status Crosstabulation

			poverty status		
			if the household is non-poor	if househod poor	
Employment status	unpaid family workers and others	Count	606	499	1105
		% within Employment status	54.8%	45.2%	100.0%
	selef employed	Count	681	443	1124
		% within Employment status	60.6%	39.4%	100.0%
	private employed	Count	300	138	438
		% within Employment status	68.5%	31.5%	100.0%
	Government or public service worker	Count	387	169	556
		% within Employment status	69.6%	30.4%	100.0%
	NGO worker	Count	41	9	50
		% within Employment status	82.0%	18.0%	100.0%
Total		Count	2015	1258	3273
		% within Employment status	61.6%	38.4%	100.0%

Appendix. I.

Basis of the HH to occupy the dwelling unit now * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if household poor	
Basis of the HH to occupy the dwelling unit now	rented from govt and NGO agencies	Count	80	21	101
		% within Basis of the HH to occupy the dwelling unit now	79.2%	20.8%	100.0%
	rented from Kebele	Count	467	629	1096
		% within Basis of the HH to occupy the dwelling unit now	42.6%	57.4%	100.0%
	rented from others	Count	478	114	592
		% within Basis of the HH to occupy the dwelling unit now	80.7%	19.3%	100.0%
	Free from employers and relatives	Count	168	54	222
		% within Basis of the HH to occupy the dwelling unit now	75.7%	24.3%	100.0%
	owned	Count	822	440	1262
		% within Basis of the HH to occupy the dwelling unit now	65.1%	34.9%	100.0%
Total		Count	2015	1258	3273
		% within Basis of the HH to occupy the dwelling unit now	61.6%	38.4%	100.0%

Appendix. J.

Source of drinking water in dry season now * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if househod poor	
Source of drinking water in dry season now	otherwise	Count	674	582	1256
		% within Source of drinking water in dry season now	53.7%	46.3%	100.0%
	tap water inside the compound	Count	1341	676	2017
		% within Source of drinking water in dry season now	66.5%	33.5%	100.0%
Total		Count	2015	1258	3273
		% within Source of drinking water in dry season now	61.6%	38.4%	100.0%

Illness of household member * poverty status Crosstabulation

			poverty status		Total
			if the household is non-poor	if household poor	
Illness of household member	Yes	Count	340	273	613
		% within Illness of household member	55.5%	44.5%	100.0%
	No	Count	1675	985	2660
		% within Illness of household member	63.0%	37.0%	100.0%
Total		Count	2015	1258	3273
		% within Illness of household member	61.6%	38.4%	100.0%

DECLARATION

I, the undersigned, declare that the thesis is my original work, has not been presented for degrees in any other University and all sources of material used for the thesis have been duly acknowledged.

Name: Tegodie Hibstu

Signature:

Place: Faculty of Science, Addis Ababa University

Date: July 2008

This thesis has been submitted for examination with my approval as a University advisor.

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Dr. Emanuel G/ Yohannes