Transient and Chronic Poverty in Kenya: Correlates and Trends

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KIPPRA Discussion Paper No. 95
2008

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The KENYA INSTITUTE for PUBLIC
POLICY RESEARCH and ANALYSIS

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Published 2008
© Kenya Institute for Public Policy Research and Analysis
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ISBN 9966 777 56 3

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KIPPRA acknowledges generous support from the Government of Kenya, European Union (EU), African Capacity Building Foundation (ACBF), and the Think Tank Initiative of IDRC.



Abstract

The pattern of poverty incidence in Kenya has changed over time, with some households moving in and out of poverty while others or their descendants have remained in poverty for decades. Rural poverty, for instance, increased from 46 per cent to about 60 per cent between 1990 and 2000, while urban poverty rose from 29 per cent to 51 per cent during the same period. In 2005/06, poverty incidence was estimated at 47 per cent, with 49 per cent of the rural population being in poverty compared to 35 per cent in urban areas. This study analyzes factors associated with chronic and transient poverty in Kenya. The study uses data of a synthetic panel of households constructed from the 1994 and 1997 household surveys. The results show that household size, educational attainment, asset ownership, and labour employment are the main correlates of poverty. Large households in rural areas face higher poverty risks than urban households. University education, wage employment, and physical assets are associated with low poverty probabilities. Working as a casual worker in the manufacturing sector is positively correlated with chronic poverty. Interventions for breaking poverty traps in Kenya include provision of post-primary education; creation of remunerative employment; upgrading of skills through on-the-job training; empowering communities to own assets, especially after a natural disaster or political instability; increasing agricultural productivity; and improving markets for livestock in semi-arid areas.

Abbreviations and Acronyms

EDE	Equally Distributed Equivalent
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
GoK	Government of Kenya
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
OLS	Ordinary Least Squares
PRSP	Poverty Reduction strategy Paper
PSID	Panel Study of Income Dynamics
SMI	Shorrocks Mobility Index
SIPP	Survey of Income and Programme Participation
SPD	Survey of Programme Dynamics
UPPAP	Uganda Participatory Poverty Assessment Process
WMS	Welfare Monitoring Survey

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1. Introduction

Absolute poverty status is a situation of deprivation, particularly of basic necessities of life. In low income economies, it is very difficult for households to escape poverty because social protection mechanisms to shield households from economic shocks and other sources of deprivation, such as bad weather and family disadvantages that transmit poverty from one generation to the next, are lacking (Hulme and McKay, 2005). Poverty is most often classified as either chronic or transitory. Hulme, Shephard and Moore (2001) define chronic poverty in terms of its extended duration; the chronic poor suffer persistent deprivation, which may be multi-dimensional in nature and severe in terms of depth. They define transient poor as the churning poor (their mean expenditure or income is close to the poverty line, so that they are sometimes poor) and occasionally poor (their mean expenditure is above the poverty line, but below the poverty line in at least one period).

In Kenya, absolute poverty rate increased to 56 per cent in 2000, up from 48 per cent in 1990 (Government of Kenya, 2003). The incidence (individuals), however, declined to 47 per cent in 2005/06 (Government of Kenya, 2007) with about 17 million people living in poverty (Table

Table 1.1: Summary of poverty estimates for Kenya, 1994-2005/06

Author	Reference year	Data source	Comments on individual poverty incidence
Narayan and Nyamwaya (1996)	1994	Participatory poverty assessment	Widespread poverty in rural areas; results similar to 1992 WMS
GoK (1998a)	1994	1994 WMS II	47% rural population; 29% urban population; 43.84% national estimates
Mwabu *et al.* (2000)	1994	1994 WMS II	40% rural population; 29% urban population; 39% national population
GoK (2000a)	1997	1997 WMS III	52.9% rural population; 49.2% urban population; 52.3% national population
Kimalu *et al.* (2001)	1997	WMS III and 1994 WMSII	60% rural population; 51% urban population; 56.7% national population
KNBS	2005/6	KIHBS 2005/06	49.7% rural population; 34.4% urban population; 46.6% national population

Source: Kimalu et al. (2002) and KNBS (2007)

1.1). However, these figures fail to capture the substantial mobility of households into and out of poverty over time. Using panel data, it is possible to show why some households fell into income poverty while others escaped it over the same time (see, for example Lawson, McKay and Okidi, 2003; Krishna *et al.*, 2004).

The pervasive nature of poverty in Kenya is one of the reasons for increasingly steering policies towards plans and strategies aimed at attacking this problem. These policies date as far back as 1963 (Government of Kenya, 1965), when the government identified poverty, disease and ignorance as the main problems to be addressed in order to achieve sustainable national development. To show further commitment to this issue, the Government of Kenya (among 189 countries) adopted the Millennium Declaration in September 2000.[1] This commitment is reflected in the most recent government policy documents, including Kenya Vision 2030, the Poverty Reduction Strategy Paper (PRSP) (1999) and the Economic Recovery Strategy for Wealth and Employment Creation (2003). The government is committed to creating employment opportunities, to provision of basic services such as education and health care, rural electrification, and establishment of land settlement schemes, among others (Government of Kenya, 2003; Nafula *et al.,* 2005).

Despite the renewed commitment to the fight against poverty, the number of people living below the poverty line has not changed significantly. About 49.7 per cent of the rural population and 34.4 per cent of the urban population in Kenya live below the poverty line (Government of Kenya, 2007). This little progress in poverty reduction raises important questions about recent policies and strategies that have been adopted to reduce poverty.[2] It also raises questions about the causes of poverty as portrayed in the literature, and about how to respond to the persistence of poverty. Duclos, Araar and Giles (2006), Jalan and Ravallion (1998) and Muyanga, Ayieko and Bundi (2007) have shown that a decomposition of poor into persons persistently trapped in poverty and those always moving in and out of poverty provides a good understanding of the multi-dimensional nature of poverty and how to address it. The fluctuating aspects of many dimensions of poverty, if captured, can provide information on mobility into and out of poverty and help design effective policies for attacking it.

[1] The main objective was to define a common vision of development by 2015. One of the most important goals to be achieved is eradication of extreme poverty and hunger.

This paper contributes to poverty literature in Kenya by decomposing the welfare of households over time. In particular, the paper analyses the correlates of persistence and transitory poverty, paying particular attention to areas of residence. It builds on earlier work by Duclos, Araaryand and Giles (2006) and Muyanga, Ayieko and Bundi (2007).

2. Literature Review

2.1 Measurement of Chronic and Transient Poverty

Measures of poverty at a point in time do not provide a good indicator of the welfare of a particular population over time. It has been demonstrated that households in many countries frequently move in and out of poverty (Lawson, McKay and Okidi, 2003; Krishna *et al.,* 2004). The stability of a welfare indicator is influenced by a large number of factors, some of which can be uncovered using only panel data (McKay and Lawson, 2002).

Yaqup (2000) and Bigsten and Shimeles (2003) distinguish between two main approaches to poverty measurement, namely, "spells" and "components" methods. In the spells approach, the chronic poor are identified based on the number or length of spells of poverty they experience, so that all poor households are classified as either chronic poor or transient poor. The spells approach is a powerful methodology of understanding how the transient poor can emerge from poverty if the analysis can identify the factors that underlie transitions.

The "components" approach distinguishes the permanent component of a household's income or consumption from its transitory variations. The permanent component can be estimated by averaging the welfare indicator over a few years, as in Jalan and Ravallion (1998). Households are identified as chronically poor if their average consumption or income level falls below the poverty line, and transiently poor if their average consumption level exceeds the poverty line, but their consumption falls below it in at least one period.

The permanent component can also be identified using predictions of a regression model that captures the relationship between a household's income or consumption and its correlates. Such a model aims to purge the effect of transitory shocks from a welfare measure.

Another way of measuring chronic poverty is to focus on length of time for which one is poor. One is considered to be in chronic poverty if one is poor in more than two consecutive periods.

Stages-of-progress approach (Krishna *et al.,* 2004) is a more recent methodology that is used to analyse entry into and exit from poverty. In their application of this approach in Kenya, Krishna *et al.* (2004) interviewed 1,706 households in 20 villages in Vihiga and Siaya districts.

Their panel spans from 1978 to 2003. The primary assumption is that knowledge about welfare changes in the case of particular households is widely shared among members of closely-knit communities. Thus, eliciting welfare information from community members can assist in reconstructing the sequence of events associated with household welfare changes. They found that 14 per cent of all households remained poor continuously over a period of 25 years. On the other hand, 19 per cent of households managed to overcome poverty. Another 19 per cent fell into poverty in the same period. They found that poor health and health-related expenses were strongly associated with descent into poverty. Other factors included heavy expenses related to funerals, large family sizes, smallholdings and uneconomical sub-division of land, and drunkenness. Similarly, escaping poverty was found to be associated with a household member obtaining a wage job, and being an owner of livestock or small business.

Ribar and Hamrick (2003) analysed factors associated with transition into and out of poverty using a multivariate discrete choice model, estimated with longitudinal data from the 1993 panel of the Survey of Income and Programme Participation (SIPP) and Survey of Programme Dynamics (SPD) collected in the United States of America. The results indicate that female-headed households face higher risk of being food insufficient, and have higher probability of falling into poverty compared to male-headed households.

Empirical studies such as the work of Bane and Ellwood (1986) explored previous approaches to analysing the dynamics of poverty using data from the Panel Study of Income Dynamics (PSID). Their work was based on spell durations and exit probabilities, which were used to derive various welfare distributions. They argue that to understand potential remedies for poverty, there is need to focus on household formation decisions and on the behaviour of secondary family members.

Gaiha and Deolalikar (1993) estimated a fixed effects model of poverty determination using nine-year panel data from India. The study found that over the period analysed, 20 per cent of households in South Indian villages had experienced poverty, and 12 per cent were never poor, while a vast majority of people constantly moved in and out of poverty.

McCulloch and Baulch (2000) used a five-year panel of 686 households to investigate the magnitude of chronic and transitory

poverty in rural Pakistan. They used Jalan and Ravallion measures of chronic and transitory poverty, and found that over 80 per cent of the total squared poverty gap is transitory, and that interventions that enable households to smooth their income over time achieve a large reduction in transitory poverty than chronic poverty.

Haddad and Ahmed (2002) used a two-year panel data of 347 households from Egypt to measure changes in household consumption between 1997 and 1999 and to identify the factors behind the changes. They used quantile regression method to identify determinants of total, chronic and transitory poverty. They found that years of schooling reduce chronic poverty the most; land and livestock assets reduce chronic poverty but not transitory poverty; the number of children under age 15 and a large household size increase total and chronic poverty; urban households were less likely to experience transitory poverty; and that employment activities in manufacturing, and in community and recreational and other non-farm sectors reduce total and chronic poverty.

The common practice to capture poverty spells is to compute the probabilities of falling into poverty, given certain states and characteristics of households. McKernan and Ratcliff (2002) used a multivariate hazard model to analyse events that trigger individual entries into and exits from poverty. They used PSID data (1975-1997) as well as 1988, 1990 and 1996 panels of the Survey Income and Programme Participation (SIPP) to analyze trigger events. They found that changes in employment, not household composition, are the most strongly correlated with poverty transitions.

Use of qualitative methodologies is uncommon in the poverty analysis literature. Lawson, McKay and Okidi (2004) analysed both quantitative (a two year panel data for 1992 and 1999) and qualitative data at the individual, household and community levels to uncover correlates of poverty. They used qualitative information from two assessments conducted as part of the Uganda Participatory Poverty Assessment Process-UPPAP (1998/99). Both the qualitative and quantitative results identify ownership of or access to assets at individual, household and community levels, lack of education and lack of key physical assets as the major factors influencing poverty transitions and persistence. Other important factors include demographic factors such as high dependency ratios or large household sizes, culture of excessive drinking, and pervasive insecurity.

Gamba, Jayne and Mghenyi (2004) analysed a two-year panel data covering 1,441 rural households in Kenya. They used a probit model to establish factors that influence rural chronic poverty. They found that initial assets, the number of household members aged over 40 years, the total acreage cultivated, distance to a tarmac road, and the highest educational attainment of male household members are negatively related to chronic poverty.

Using a more recent methodology, Duclos, Araaryand and Giles (2006) analysed household level surveys from 82 villages in nine provinces in China. They propose a new approach to separating poverty into chronic and transient components and provide corrections for statistical biases. They found that transient poverty represents about 23 per cent of total poverty in rural China.[21]

Muyanga, Ayieko and Bundi (2007) analyze rural household poverty in Kenya using a panel dataset drawn from 1,500 rural households interviewed in 1997, 2000 and 2004. They use both Jalan and Ravallion (2000) and equally distributed equivalent (EDE) poverty gaps approach proposed by Duclos, Araar and Giles (2006). They found that there was significant movement in and out of poverty over the study period. For the same measure of risk aversion and the same poverty line, transient poverty constituted about 75 per cent of total poverty and dominated chronic poverty using the Jalan and Ravallion method, while using the EDE approach, chronic poverty made up 79 per cent of total poverty.

In this study, the spells and components approaches are applied as in Bigsten and Shimeles (2003) and Gamba, Jayne and Mghenyi (2004). The spells approach is used to classify the poor into non-poor, transitory and chronically poor in order to understand the processes associated with movement of people into or out of poverty over a span of time. The poverty decomposition is conducted using Duclos, Araaryland and Giles (2006) approach.

2.2 Overview of the Literature

Several studies have analyzed the determinants of dynamics of poverty but using different methods. The most common method uses quantitative panel datasets. However, the use of combined quantitative and qualitative analysis is now common (Lawson, McKay and Okidi,

[2] This significantly departs from Jalan and Ravalion (1998), which suggested that transient poverty accounts for 73 per cent of total poverty.

2004). Earlier studies looked at poverty dynamics predominantly in relation to income or consumption poverty using household panel survey data. Further, much of the focus on poverty analysis has been on the identification of overall poverty and on finding correlates to poverty, without developing an understanding of factors that lead some people to poverty traps while enabling others to escape them (Hulme and McKay, 2005). Apart from the study by Duclos, Araaryand and Giles (2006) and Muyanga, Ayieko and Bundi (2007), most of the studies on measurement of poverty have ignored the effect of biases introduced by a short series dimension of the data used to measure poverty.

This study contributes to existing literature in several ways. First, it looks at the determinants of both chronic and transient poverty and, secondly, it combines cross-sectional survey data from Kenya to undertake an analysis of poverty dynamics at the national level. The analytical sample is constructed from Welfare Monitoring Surveys of 1994 and 1997 collected by the Kenya National Bureau of Statistics.

Information on characteristics of the chronically poor provides a clearer understanding of the factors associated with poverty. According to McKay and Lawson (2002), the chronically poor include those in disadvantageous situation with respect to human capital, demographic composition, location, physical assets and occupational status, among others.

Human capital

Available evidence relating to education suggests that increasing human capital will decrease the probability of being chronically poor (Lawson, McKay and Okidi, 2004). Research has shown that increased schooling decreases the probability of being chronically poor. This association, however, varies from one country to another. Some studies show that it is the higher levels of education, such as secondary schooling (McCulloch and Baulch, 2000) and university education that are strongly associated with low probability of chronic poverty.

Other evidence from human capital-based studies finds that illiteracy is positively related to chronic poverty, but this matters more if people also possess management skills.

Demographic factors

Other factors being equal, a large household size tends to place an extra burden on a household's resource base and would generally be positively related to chronic poverty (Salehi-Isfahani, 2003). This also applies to high dependency ratios, and the presence of a third generation in a household (McCulloch and Baulch, 2000).

Single headed households are more likely to be amongst the long term poor. In Hungary, single parent-headed households were found to be twice as likely to be in long term poverty, especially if headed by a female. Similar results were found in Italy (Salehi-Isfahani, 2003).

Location

Residence plays a major role in the opportunities available to households, and is strongly associated with the probability of being classified as long term poor. In many African countries, poverty is a rural phenomenon. Using data from a panel of four years, 1992/93 to 1995/96, Okidi and Mugambe (2002) found that of the households that were poor throughout the years, 82 per cent lived in rural areas. Further, the majority (41%) of those who experienced poverty in the four years were in Eastern Province, while the largest non-poor (34%) were households from Central Uganda.

Physical assets and occupational status

Lack of physical assets is another important factor often associated with chronic poverty (McCulloch and Baulch, 2000). Land ownership and possession of liquid assets are negatively associated with chronic poverty.

Economic activity is an important correlate to chronic poverty. Okidi and Mugambe (2002) found that self employment in agriculture is associated with a 70 per cent probability of being chronically poor, while neither of the households that were formally employed (either in agriculture or non-agriculture sector) nor those that were self employed in non-agriculture sectors experienced persistent poverty during the years under observation.

3. Methodology and Data

Dynamic analysis of poverty requires panel datasets in order to distinguish transient from chronic poverty. However, nationally representative panel datasets are not available in Kenya. McKay and Lawson (2002) have proposed alternative ways of using "dynamic information" from static data or repeated cross-sectional household surveys to analyze poverty dynamics, as long as certain assumptions are made and limitations of this approach are duly recognized.

In order to overcome the problem of lack of repeated panel data in this study, a pseudo-panel is created using cohort clusters for Welfare Monitoring Surveys II for 1994 and 1997, respectively. The 2005/06 Kenya Integrated Household Budget Survey data used a different sampling frame and, therefore, could not be used in this study. The household is the unit of analysis.

The study makes the following two assumptions. First, all households (represented by the median household) belonging to cluster i, are homogeneous. The more homogeneous the groups in a cluster, the more precise our estimates are and also the more the estimated parameters will resemble those obtained using the individual household observations. Using a similar method, Christiaensen and Subbarao (2004) found that between 55 and 70 per cent of the changes in household welfare was explained by variations across communities, confirming the homogeneous character of the communities (in this case villages or clusters of villages or households). The second assumption in this study is that the composition of poverty (e.g., transitory versus long-term) remained constant between the years for which data is unavailable. The advantage of the method used here is that it can estimate any changes in poverty that occur in these homogeneous groups with greater precision than among individuals in usual panels of poverty spells. In pseudo panel analysis, there is no problem of attrition bias, since the same cohort, in this case cluster, is always observed, and information for the cluster is the median household, a situation that considerably reduces measurement error.

The median household is assumed to have most of the characteristics of the various households in the cohort. The number of median households is used to determine the sample size, which is about the same as the number of clusters. Given that we have a median household for each cohort, we are able to compute the change in the poverty level

for this particular household using the consumption expenditure in the two surveys. Households that are below the poverty line in both 1994 and 1997 are classified as "chronically poor". Similarly, households that fell into poverty or exited from poverty between 1994 and 1997 were classified as "transiently poor", while those that remained above the poverty line in both periods were categorized as "non-poor". The results from this study are interpreted from the perspective of a cohort, and not from the perspective of a household or an individual, because the median household in the analytic sample represents a group of households in a cluster that is assumed to remain unchanged from one period to the next (Ribas and Machados, 2007).

In designing the poverty transition matrix, we group the household incomes into four equal groups using a normalized poverty line. The first household group is the income *spline* 0 to 1, the second group is in *spline* 1 to 2, while the third group is in *spline* 2 to 3 and the fourth group is in *spline* 3 to 4. The cohort that moves from one income group to another is referred to as the mobile group, while the one that does not move is called the immobile group. The mobiles that experience a positive change in relative well-being are referred to as "winners" in a welfare game as opposed to "losers" (Muyanga, Ayieko and Bundi, 2007).

In order to decompose aggregate poverty into chronic and transient poverty, we employ two methodologies. First we use the Jalan and Ravallion (2000) and the money metric measure of welfare and inequality (the Equally Distributed Equivalent-EDE) poverty gaps approach) proposed by Duclos, Araar and Giles (2006) and used by Muyanga, Ayieko and Bundi (2007). Lastly, we use ordered logit model to analyse the determinants of chronic poverty.

3.1 Measurement of Chronic and Transient Poverty

Jalan and Ravallion's Approach

A poverty measure is an index that shows the magnitude of poverty in a society. To define aggregate chronic and transient poverty, we have adopted the decomposition method proposed by Jalan and Ravallion (1998), who define household poverty as:

$$P_i = P(y_{i1}, y_{i2}, \ldots\ldots\ldots y_{it} \qquad \ldots\ldots(1)$$

Where y_{it} is a measure of median household i's welfare at time t, and

there are T periods in which it is measured. P is some well-defined poverty measure, such as the Foster-Greer-Thorbecke poverty measure. Thus, using the squared poverty gap measure, they define total poverty P_i as the expectation over time of the poverty measure at each point in time P_{it}.

$$P_i = \frac{1}{T}\sum_{t=1}^{T} P_{it} \quad \text{.....(2)}$$

where P_{it} is

$$P_{it} = \begin{cases} \left(\frac{z - y_{it}}{Z_0}\right)^{\alpha} & if \quad y_{it} < z \\ & if \quad y_{it} \geq z \end{cases} \quad \text{.....(3)}$$

and z is the poverty line, with α being a measure of poverty aversion. In our analysis, we use a normalized poverty line and a value of alpha equal to 2.

A median household's chronic poverty level is then defined as:

$$C_{it} = P(E_t(y_{it})) \quad \text{.....(4)}$$

That is, chronic poverty c_{it}, associated with the median household, is a function of the mean income of that household over T periods. This can be written as expectation over time of the household's chronic poverty at each point in time as:

$$c_{it} = \begin{cases} \left(\frac{z - E_t[y_{it}]}{z_0}\right)^{\alpha} \end{cases} \quad \text{.....(5)}$$

Where, $E_t[y_{it}]$ is the expected value over time of the income of household i. From equation (2), the transitory poverty of median household i, at time T_i, where i indexes the household, is then defined to be the residual, $p_{it} = P_i - C_i$.

3.2 Equally Distributed Equivalent (EDE) Poverty Gaps Approach

Consider a vector $y = (y_{1,} y_{2,} y_{3,} \ldots . y_n)$ of living standards y_i for *n* individuals, where $y_i = (y_{i1,} y_{i2} y_{i3,} \ldots . y_{in})$ is a vector of individual *i*'s incomes across *t* periods.

We assume that each income has been normalized initially by the poverty line at time *j,* meaning that the income is expressed as a ratio of the poverty line so that an individual *i* with y_{ij} =1 *is* exactly at the

poverty line at time *j*.

The normalized poverty gap for income y_{ij} can be defined as:

$$g_{ij} = (1-y_{ij}) \quad \text{.....(6)}$$

where y_{ij} is household *i*'s normalized income in time *j;* that is, both income and the poverty line are normalized by the poverty line as at time *j*, and that there are *n* median households and *t* time periods so that if in equation (6), y_{ij} =1, the poverty rate is equal to zero, as there are no poor people.. The vectors $g = (g_{1,} g_{2,} \ldots . g_n)$ and $g_i = (g_{i1,} g_{i2} g_{i3,} \ldots . g_{in})$ are the corresponding vectors of poverty gaps. One poverty measure that has been found manageable in presenting information on the poor in an operationally convenient manner is the FGT (Foster *et al.*) measure[3] developed by Foster, Greer and Thorbecke (1984). Over the *n* median households and the t periods, and thus over the vector *g*, the FGT indices are defined as:

$$p_\alpha(g) = (nt)^{-1} \sum_{i=1}^{n} \sum_{j=1}^{t} g_{ij}^{\alpha} \quad \text{.....(7)}$$

As in Duclos, Araaryand and Giles (2006) and Muyanga, Ayieko and Bundi (2007), we measure social welfare using EDE poverty gap approach. EDE poverty gap is defined as $\Gamma_\alpha(g)$, which if assigned to all households and in all times, would produce the same poverty measure as that generated by the distribution *g* of poverty gaps. Thus equation (8) below implies that $T_\alpha(g)^\alpha = P_\alpha(g)$ so that:

$$\Gamma'_\alpha(g) = P_\alpha(g)^{1/\alpha} = \alpha\sqrt{P^\alpha(g)} \quad \text{.....(8)}$$

Where $\Gamma_1(g)$ is the average poverty gap. However, $\Gamma_1(g)$ as a measure of poverty does not take into account inequality in poverty status within the group. Inequality in poverty raises the social cost of poverty above the average poverty gap $\Gamma_1(g)$. Thus, an inequality-corrected measure of poverty should be greater than $\Gamma_1(g)$ and should be sensitive to the existence of inequality among the poor. This property holds for $\Gamma_1(g)$, whenever $\alpha \geq 1$. Whenever all households have the same size of poverty gap, then $\Gamma_\alpha(g) = \Gamma_1(g)$ holds.

[3] This measure is used to qualify the three well-konwn elements of poverty: the level, depth, and severity (also known, respectively, as incidence, inequality, and intensity of poverty (Jenkins and Lambert, 1997).

The mean-preserving increase in the income spread between two median households, with at least one of them being poor, strictly increases $\Gamma_\alpha(g)$ whenever α greater than 1 is. Thus for a given α, the more important the difference between $\Gamma_\alpha(g)$ and $\Gamma_1(g)$ is, the more unequal the distribution of poverty gaps is.

This implies that a measure of the cost of inequality in the distribution of poverty gap is:

$$C_\alpha(g)= \Gamma_\alpha(g)-\Gamma_1(g) \quad \text{.....(9)}$$

Where $C_\alpha(g)$ is per capita income in monetary terms and is thus easy to compare with $\Gamma_1(g)$ and other indicators. $C_\alpha(g)$ is always non-negative and is the cost in average poverty gap that a social decision maker would be willing to pay in order to eliminate all inequality in the distribution of poverty gaps without a change in total poverty. Consequently, rewriting equation (9), total poverty can be expressed as:

$$\Gamma_\alpha(g)= \Gamma_1(g)+ C_\alpha(g) \quad \text{.....(10)}$$

Transient poverty is associated with income variability, and therefore inequality in household poverty can be computed using the above frameworks. Let $\gamma\alpha(gi)$ be the EDE poverty gap for the median household *i*, so that:

$$\gamma_\alpha(g_i)=\sqrt[\alpha]{(T-1\sum_{j=1}^{T} g_{ij}} \quad \text{.....(11)}$$

Invoking the cost-of-inequality index, a natural measure of the cost of transience in median household *i*'s poverty status is:

$$\theta_\alpha(g_i)=\gamma_\alpha(g_i)-\gamma_1(g_i) \quad \text{.....(12)}$$

$\theta_\alpha(g_i)$ is non-negative for any $\alpha \geq 1$

The EDE poverty gap $\gamma_\alpha(g_i)$ is interpreted as the variability-adjusted poverty status, while $\gamma_1(g_i)$ is the median household *i*'s risk premium while $\theta_\alpha(g_i)+\gamma_1(g_i)$ is the median household's variability-adjusted poverty status. Intuitively, median household i would be willing to pay $\theta_\alpha(g_i)$ in units of his average poverty gap to eradicate variability in his poverty gap measure. Aggregating the transiency cost $\theta_\alpha(g_i)$ across the *n* median households to obtain the aggregate magnitude of transiency, we get:

$$\Gamma_\alpha^T(g) = N^{-1}\sum_{i=1}^{N}\theta_\alpha(g_i) \quad \text{.....(13)}$$

Where, $\Gamma_\alpha^T(g)$ is the cost of inequality within a household.

Lastly, we consider the distribution of household EDE poverty gaps $\gamma_1(g_i)$, which represents the distribution of households' ill-fare (Muyanga, Ayieko and Bundi, 2007), in the presence of both chronic and median household transient poverty and can be expressed as:

$$\gamma_\alpha = \gamma_\alpha(g_1), \gamma_\alpha(g_2), \gamma_\alpha(g_3), \ldots\ldots, \gamma_\alpha(g_N) \quad \ldots\ldots(14)$$

Aggregating poverty over γ_α we obtain:

$$\Gamma_\alpha(\gamma_\alpha) = \sqrt[\alpha]{N-1\sum_{i=1}^{N} \gamma\alpha(gi)\alpha}. \quad \ldots\ldots(15)$$

Thus the cost of inequality in the EDE poverty gap γ_α is:

$$C_\alpha(\gamma_\alpha) = \Gamma_\alpha(\gamma_\alpha) - \Gamma_1(\gamma_\alpha) \quad \ldots\ldots(16)$$

$C_\alpha(\gamma_\alpha)$ is always non-negative. It is the cost of inequality between households, and is also referred to as the cost in units of average poverty gap that a social decision maker would be willing to pay to remove all inequality in the distribution of poverty gaps without a change in total poverty. According to Duclos, Araaryand and Giles (2006), total poverty is $\Gamma_\alpha(g)$ and can be expressed as:

$$\Gamma_\alpha(g) = \Gamma_1(g) + C_\alpha(\gamma_\alpha) + \Gamma^T_\alpha(g) \quad \ldots\ldots(17)$$

Where $\Gamma_\alpha(g)$ is the sum of the average poverty gaps in the population, $C_\alpha(\gamma_\alpha)$ is cost of inequality in household EDE poverty gap and $\prod^t_\alpha$ is the transient poverty. Chronic poverty is thus the difference between total poverty and transient poverty which, as before, can be stated as:

$$\Gamma\theta(g) = \Gamma_1(g) + C_\alpha(\gamma_\alpha) \quad \ldots\ldots(18)$$

Transient poverty represents the cost of the variability of poverty gap over time. Thus, rewriting equations (16-18), total poverty takes the form:

$$\Gamma_\alpha(g) = \Gamma\theta(g) + \Gamma^T_\alpha(g) \quad \ldots\ldots(19)$$

On the other hand, the total cost of inequality in poverty gap is the sum of the cost of inequality between individuals and that of inequality within individuals (Duclos, Araaryand and Giles, 2006), which we express as:

$$C_\alpha(g) = C_\alpha(\gamma_\alpha) + \Gamma^T_\alpha(g) \quad \ldots\ldots(20)$$

Where $C_\alpha(g)$ is total inequality; $C_\alpha(\gamma_\alpha)$ is cost of inequality

between individuals and $\prod^t$ is cost of inequality within individuals. All the three expressions in α equation (20) are equal to α and are increasing in the inequality of poverty gaps. This means that a mean-preserving inequality increasing change in the EDE poverty gap will increase $C_\alpha(\gamma_\alpha)$, and a mean-preserving variability-increasing change in the temporal distribution of poverty gap will increase $\Gamma^t_\alpha(g)$ (Duclos, Araaryand and Giles, 2006). Both the changes will, therefore, increase $C_\alpha(g)$ and $\Gamma^t_\alpha(g)$, and can be given a money metric interpretation. Thus $C_\alpha(g)$ is the cost in average poverty gap units that a social decision maker would be willing to incur to remove between-individual inequality in welfare status, and $\Gamma^t_\alpha(g)$ is the cost that individuals would collectively be willing to incur to remove within-individual variability in welfare status.

3.3 Empirical Model

To analyse the factors that influence chronic poverty, we estimate an ordered logit model as in Bigsten and Shimeles (2003). The dependent variable represents the poverty status of the median household in a cluster. The poverty index of the household indicates whether a household is transiently poor or non-poor in a particular period. The index takes a value of zero if the household is not poor, a value of 1 for transitory poverty and a value of 2 for chronic poverty. Since these categories have a natural ordering, ordered multinomial logit or probit is the appropriate model to use (Maddala, 1983; Greene, 1993) to compute the associated poverty probabilities.

The ordered logit models assume that the probability of being in a particular poverty category is determined by an underlying response variable whose disturbance term is logistically distributed. The independent variables used in the application of these models to the analysis of poverty status of Kenyan households between 1994 and 1997 include: education, demographics, access to land and other physical assets, occupational categories, and health of household members.

The ordered logit and probit models have several advantages over the ordinary least squares (OLS) model, the most important of these being a specification that makes predicted probabilities to be well defined.

The model we estimate takes the following form:

$$y^* = \beta' x + \varepsilon \quad \text{.....(21)}$$

y^* is unobserved but we observe y, β' is a vector of unknown parameters; *x* is a vector of known explanatory variables.

$$y = 0 \quad if \quad y^* \le 0$$
$$y = 1 \quad if \quad 0 \le y^* \le \mu_1,$$
$$y = 2 \quad if \quad \mu_1 \le y^* \le \mu_2,$$

The $\mu's$ are unknown parameters to be estimated, along with the betas, β. The *x* are the explanatory variables, all of which are assumed to be exogenous. An individual can be grouped into any of the three poverty categories depending on observable factors (x_s) and unobserved (ε) factors that determine the poverty status.

Assuming three categories (0, 1 and 2 and associated probabilities *P*0, *P*1 and *P*2), an individual would fall in category 0 if $\varepsilon < \beta' x$, in category 1 if $\beta' x < \varepsilon \le \beta' x + \alpha$ and in category 2 if $\varepsilon \ge \beta' x + \alpha$, where α > 0, and ε is the error term in the underlining response model (equation 21). These relationships may be formalized as follows:

$$\begin{aligned} &\Pr ob(y = 0) = \phi(-\beta' x) \\ &prob(y = 1) = \phi(\mu_1 - \beta' x) - \phi(-\beta' x) \\ &prob(y = 2) = 1 - \phi(\beta' x + \alpha) \end{aligned} \quad \text{.....(22)}$$

Where the distribution ϕ is logistic in the ordered logit model. This can be generalized for *m* categories (Maddala, 1983).

Given equation (22), the associated log-likelihood function and its derivatives can be obtained readily. To obtain the marginal effects of the regressors, *x*, on the probabilities, we take the derivative of the function at the probability of the occurrence of each category.

For the three probabilities noted above, the marginal effects of changes in the regressors are given by:

$$\frac{\partial \Pr ob(y = 0)}{\partial x} = -\phi(-\beta' x)\beta,$$
$$\frac{\partial \Pr ob(y = 1)}{\partial x} = (\phi(-\beta' x) - \phi(\mu - \beta' x)\beta, \quad \text{and}$$
$$\frac{\partial \Pr ob(y = 2)}{\partial x} = \phi(\mu - \beta' x)\beta. \quad \text{.....(23)}$$

Where ϕ(.) is the standard normal density function.

3.4 Data, Variable Definitions and Measurement

The empirical work in this paper is based on two Welfare Monitoring Survey (WMS) datasets that were conducted in Kenya in 1994 and 1997. The 1994 WMS was conducted from June to August, the peak of the "drought season" when most households experience severed shortfalls in the consumption of staple foods, and the 1997 WMS was conducted from April to June, the period following harvests from the short rains. In districts that have two agricultural seasons, this period coincided with harvesting time, while it was the onset of hunger season in those districts with one agricultural season.

The surveys selected random samples of the population in each of the years. The socio-economic and demographic data available in the surveys is in a repeated cross section format that does not allow the tracking of individual households over time, but instead tracks the clusters in which the households lived. The sampling frame for the two WMSs is the same, as the clusters were not changed, but the households in the clusters were not the same in both years because they were selected at random. Thus, it is impossible to observe individual household behaviour and economic conditions throughout the surveys' periods. The analysis is limited to 1994 and 1997, since the recent Kenya Integrated and Household Budget Survey (KIHBS) 2005/06 was based on a different sampling frame.

The two multipurpose surveys contain information covering a variety of dimensions, including incomes and expenditures, education of all household members, labour supply, asset ownership, and land holdings. The two datasets were combined to form a 'pseudo panel' of clusters and households over time. For each year, the household with the median consumption expenditure in each cluster was selected. This sample mainly constituted the individual characteristics of the household head. Following this classification, 1,250 cluster cohorts (cohorts of median households) were constructed and used for analysis.

The variables used in the analysis include demographic composition (household size, age of household head, sex of household head); household head's type of employment (wage and non-wage employment); human capital (highest level of education attained by household head); physical capital (area of cultivated land owned, number of livestock; occupation (whether the primary occupation of the primary income earner is in manufacturing or agriculture); and region of residence

(urban or rural). Sex (1=male), marital status (1=polygamous), primary education (1=primary education), secondary education (1=secondary education), university education (1=university education), agriculture (1= agriculture), manufacturing (1=manufacturing), wage employment (1=employed), residence (1=rural) are dummy variables taking the value of one, otherwise zero. The summary statistics of other variables is in annex Table A1.

Table 3.1 presents descriptive statistics from the two cross-sections. As can be seen from the table, the mean household size is 5 members, and the means for land size and the number of livestock owned are 3.8 acres and 3.0 units, respectively.

Table 3.1: Summary statistics

	Observations	Mean	Std. Dev.	Minimum	Maximum
Poverty status (1=poor)	1,742	.626	0.625	0	1
Household head's age (years)	1,742	44.274	14.668	18	99
Household head's age squared	1,742	2175.234	1480.662	324	9801
Household size	1,742	5.331	2.799	1	27
Total cultivation land owned	1,708	3.835	11.329	0	300
Number of cows owned	1,735	2.987	11.801	0	240

4. Results and Discussions

4.1 Movements in the Distribution of Consumption

The panel data allows us to use transition matrices in describing upward or downward mobility of households across quintiles based on their consumption levels in the years under observation. The transition matrix provides information on the proportion of households that moved from state i to state j over the two time periods. It provides information on the extent of economic mobility for households in various income quintiles. Table 4.1 below shows a transition matrix that maps changes in household welfare from 1994 to 1997 in relation to income quintiles. The first column indicates the distribution of consumption levels by income quintiles in 1994, while the first row shows distribution of consumption by quintiles in 1997. Mobility between the two years is very low, with about 78.6 per cent of the households that were in quintile 1 in 1994 remaining in the same quintile in 1997 (Standard errors in parenthesis).

To summarize the extent of mobility in a population from the transition matrix, the Shorrocks Mobility Index (SMI) is used. This index is defined as (n-trace of a matrix)/ (n-1), where n is the number of categories in the quintiles. The SMI is usually normalized by dividing it by (n/ (n-1)). The closer the SMI is to 1, the more mobility there is within the cohort (Swanepoel, 2005). The transition matrix shows that

Table 4.1: Transition matrix for all cohorts households between 1994 and 1997

Cohort 1994 (Row)/ 1997 (Column)	0.0-1.5	1.5-3.0	3.0-4.5	4.5-6.0	Total
0.0-1.5	78.6	6.1	0.9	0.6	87
	(0.012)	(0.007)	(0.003)	(0.002)	(0.009)
1.5-3.0	8.1	1.7	0.5	0.2	10.6
	(0.008)	(0.004)	(0.002)	(0.001)	(0.009)
3.0-4.5	1.1	0.2	0	0	1.4
	(0.003)	(0.001)	0.000	0.000	(0.003)
4.5-6.0	0.5	0.2	0	0	0.63
	(0.002)	(0.001)	0.000	0.000	(0.002)
Total	88.5	8.2	1.4	0.7	98.5
	(0.009)	(0.008)	(0.003)	(0.002)	(0.000)

Source: Author's computation

SMI is 0.19, indicating a relatively low mobility between 1994 and 1997. However, this index does not give an indication of the direction of the mobility.

4.2 Poverty Decomposition

In carrying out poverty decomposition, we used both the Jalan and Ravallion and EDE approaches. We used per capita median household income as proxy for cohort consumption. The consumption-based poverty line was constructed on the basis of a 2,250-calorie diet in accordance with the main literature in this area (Foster, Greer, and Thorbecke, 1984). We correct for statistical biases in the estimation of chronic and transient poverty indices. This is important because the number of periods over which welfare is observed is small. As shown in Table 4.2, a transient poverty estimate, according to Jalan and Ravallion (1990), is significantly more dominant than a chronic poverty estimate even after correcting for estimation bias. Transient poverty accounts for 30 per cent of the total poverty. After correcting for the bias, transient poverty increases as expected to 56 per cent of the total poverty, using the Jalan and Ravallion measure. In Jalan and Ravallion approach, the biases directly affect estimation of chronic poverty, while in the EDE approach, the biases directly affect estimation of transient poverty. The Jalan and Ravallion transient poverty and EDE chronic poverty are also biased since they are both derivatives of biased estimators (Duclos, Araar and Giles, 2006). The statistical bias corrections significantly enhance the precision of poverty estimates. The Jalan and Ravallion approach is known to over-estimate the transient poverty component (Duclos, Araar and Giles, 2006).

Table 4.2: Jalan and Ravallion transient and chronic poverty, with and without bias correction: $\alpha=2$

Index	Without bias correction	%	With bias correction	%
Bias			0.0899 (0.0041)	
Transient poverty	0.1019 (0.0033)	30	0.1919 (0.0068)	56
Chronic poverty	0.2383 (0.0060)	70	0.1484 (0.0078)	44
Total poverty	0.3402 (0.0059)	100	0.3402 (0.0059)	100

Standard errors in parenthesis

Using the same data to decompose poverty using the EDE approach, the average poverty gap is 0.45. Duclos, Araar and Giles (2006) show that poverty gaps are most volatile for individuals in the middle of the distribution of poverty gaps. Those with an average poverty gap close to 1 are almost always desperately poor, and the variability of their poverty status across time is always very low, while those with an average poverty gap close to 0 are almost always very close to or above the poverty line, and the variability of their poverty status across time is thus quite low. In this case, poverty gap variability between 1994 and 1997 is very high.

Using the same data to decompose poverty using the EDE approach, with and without bias corrections for the same α and same poverty line, Table 4.3 shows that total poverty is 0.62 (0.58 without bias correction). Chronic poverty now represents 83 per cent of the total poverty, while transient poverty represents 17 per cent (12% without bias correction) of total poverty. The transient poverty inequality within cohorts is estimated at 0.107. This is the cost in average poverty gap units that households in a cluster would collectively accept to pay to eliminate within cluster variability of poverty. The cost of inequality between clusters is 0.067 and is the cost in average poverty gap units that the social decision maker would want to spend to remove between cluster inequalities in welfare. The total cost of inequality in poverty gaps is the sum of the cost of inequality between clusters and that of inequality within households in a cluster, which is estimated at 0.174. In our case, a social decision maker would be willing to spend at most about 17 per cent of the cost of the total poverty to eliminate intra-cluster inequality in poverty status. For the same α and same poverty line, this compares unfavourably with Ravallion estimates, which suggest for the same

Table 4.3: EDE transient and chronic poverty, with and without bias correction: $\alpha=2$

Components	Without bias correction	%	With bias correction	%
Average gap	0.4469 (0.0072)		0.4469 (0.0072)	
Cost of inequality between households	0.0655 (0.0025)		0.0673 (0.0026)	
Transient poverty–Inequality within households	0.0709 (0.0019)	12	0.1068 (0.0029)	17
Chronic poverty	0.5124 (0.0059)	88	0.5142 (0.0057)	83
Total poverty	0.5833 (0.0059)	100	0.6211 (0.0061)	100

Standard errors in parenthesis

parameter values that transient poverty accounted for 56 per cent of total poverty.

4.3 Ordered Logit Results

In establishing factors that are strongly associated with chronic poverty in Kenya, we estimate an ordered logit model. For the ordered logit model, the probability of an outcome is calculated as a linear function of the independent variables plus a set of cut-off points that help determine the classification of a household's poverty status. Using the national sample, 0.44 and -1.34 cut-off points are chosen (Annex Table A1b).

Consistent with the proportional odds assumption, the slopes are the same (standard error of 0.74).[4] This means that the effect of each explanatory variable is a proportionate change in the odds of poverty status associated with explanatory variables. Thus, if a certain explanatory variable doubles the odds of being in always poor category (category 1), the variable will also double the odds of being in category 2 (sometimes poor), or in category 3 (never poor).

According to the ordered logit model results presented in annex Table A1b, the goodness of fit (Chi^2) is significant with Pseudo R^2 of 7.4 per cent. The low Pseudo R^2 is expected, since not all variables that explain poverty transitions are captured using cross-sectional panel data.

Results presented in Tables 4.4, 4.5 and 4.6 provide marginal analysis of the factors that influence chronic poverty in Kenya for the national sample under various poverty outcomes (never poor, sometimes poor, and always poor).

The main factors influencing chronic poverty include demographic characteristics such as household size, education, household's main economic activity, region of residence, asset ownership, and wage employment status.

Demographic characteristics

Holding other factors constant, a marginal increase in household size is negatively related to the probability of being non-poor (Table 4.4).

[4] According to the Parallel Slopes Assumption (proportional odds assumption), the separate equations for each poverty category should differ only at the incept, and slopes should be the same when going from each category to the next (Rueda, 2006).

Table 4.4: Marginal effects: Probability of being never poor (national sample)

Variable |	dy/dx	Std. Err.	Z	P>|z|
Age	0.00036	0.0013	0.2800	0.7770
Age2	-0.0000026	0.0000	-0.2100	0.8350
Household size	-0.00648	0.0014	-4.6800	0.0000
Sex*	0.00131	0.0078	0.1700	0.8660
Marital status polygamy*	0.00734	0.0119	0.6200	0.5380
Primary_1*	-0.00214	0.0083	-0.2600	0.7960
Secondary_1*	0.01808	0.0113	1.6000	0.1100
University_1*	0.12693	0.0749	1.6900***	0.0900
Agriculture_1*	-0.01716	0.0079	-2.1700**	0.0300
Manufacturing_1*	-0.02342	0.0116	-2.0300**	0.0430
Wage employment*	0.02736	0.0088	3.1300	0.0020
Total land owned	0.00031	0.0002	1.3400	0.1820
Number of livestock (e.g. cows) owned	0.00053	0.0002	2.1900**	0.0290
Rural urban*	-0.04193	0.0132	-3.1800*	0.0010
Central*	-0.03483	0.0215	-1.6200	0.1040
Coast*	-0.03128	0.0201	-1.5600	0.1190
Eastern*	-0.02736	0.0219	-1.2500	0.2120
Nyanza*	-0.03234	0.0211	-1.5300	0.1260
Rift Valley*	-0.00439	0.0299	-0.1500	0.8830
Western*	-0.04977	0.0130	-3.8300***	0.0000

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Assuming household size is exogenous, an additional family member tends to place extra burden on a household's resource base, therefore increasing the probability of being in chronic poverty. Household size also tends to increase dependency ratios, especially if the number of children and the elderly is higher than the number of productive and working household members.

Educational attainment

Results on impact of educational attainment on chronic poverty show that a one unit increase in education attainment, especially secondary and university education, significantly increases the probability of the household being non-poor. This suggests that increasing human capital formation will decrease the probability of being chronically poor.

Table 4.5: Marginal effects: Probability of being sometimes poor (national sample)

Variable	dy/dx	Std. Err.	Z	P>|z|
Age	0.0009	0.0032	0.2800	0.7770
Age2	-0.000007	0.00001	-0.2100	0.8350
Household size	-0.0166	0.0035	-4.7600*	0.0000
Sex*	0.0034	0.0202	0.1700	0.8670
Marital status polygamy*	0.0182	0.0287	0.6400	0.5250
Primary_1*	-0.0055	0.0213	-0.2600	0.7960
Secondary_1*	0.0439	0.0258	1.7000***	0.0890
University_1*	0.1789	0.0482	3.7100*	0.0000
Agriculture_1*	-0.0436	0.0197	-2.2200**	0.0270
Manufacturing_1*	-0.0676	0.0371	-1.8200***	0.0680
Wage employment*	0.0668	0.0200	3.3500*	0.0010
Total land owned	0.0008	0.0006	1.3400	0.1810
Number of livestock (e.g. cows) owned	0.0014	0.0006	2.2000**	0.0280
Rural urban*	-0.0919	0.0243	-3.7900*	0.0000
Central*	-0.0986	0.0653	-1.5100	0.1310
Coast*	-0.0902	0.0639	-1.4100	0.1580
Eastern*	-0.0774	0.0674	-1.1500	0.2510
Nyanza*	-0.0921	0.0653	-1.4100	0.1590
Rift Valley*	-0.0114	0.0783	-0.1500	0.8840
Western*	-0.1555	0.0452	-3.4400*	0.0010

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Increasing the aggregate number of years of schooling, especially by promoting post-primary education would decrease the probability of being chronically poor. This is probably because secondary education is the foundation for skills development, and tertiary education is associated with acquisition of employable skills. This finding is consistent with that of McCulloch and Baulch (2000), who established that it is the higher levels of education, such as secondary schooling and university, which reduce the probability of chronic poverty the most.

On the other hand, primary education reduces the probability of being never poor, but the effect is statistically insignificant. Thus, although reducing illiteracy and providing primary education is likely to reduce the probability of being sometimes poor and always poor,

Table 4.6: Marginal effects: Probability of being always poor (national sample)

Variable	dy/dx	Std. Err.	Z	P>|z|
Age	-0.0013	0.0045	-0.2800	0.7770
Age2	0.00001	0.00004	0.21000	0.83500
Household size	0.0231	0.0047	4.8800*	0.0000
sex*	-0.0047	0.0280	-0.1700	0.8670
Marital status polygamy*	-0.0256	0.0406	-0.6300	0.5290
Primary_1*	0.0076	0.0296	0.2600	0.7960
Secondary_1*	-0.0620	0.0370	-1.6700***	0.0940
University_1*	-0.3058	0.1218	-2.5100**	0.0120
Agriculture_1*	0.0607	0.0274	2.2200**	0.0270
Manufacturing_1*	0.0910	0.0484	1.8800***	0.0600
Wage employment*	-0.0941	0.0283	-3.3200*	0.0010
Total land owned	-0.0011	0.0008	-1.3400	0.1800
Number of livestock (e.g. cows) owned	-0.0019	0.0009	-2.2100**	0.0270
Rural Urban*	0.1338	0.0368	3.6300*	0.0000
Central*	0.1335	0.0865	1.5400	0.1230
Coast*	0.1214	0.0837	1.4500	0.1470
Eastern*	0.1048	0.0892	1.1700	0.2400
Nyanza*	0.1244	0.0862	1.4400	0.1490
Rift Valley*	0.0158	0.1081	0.1500	0.8840
Western*	0.2052	0.0574	3.5800*	0.0000

(*) dy/dx is for discrete change of dummy variable from 0 to 1

it is not sufficient in empowering households to fully escape from poverty. Further, secondary and tertiary education play an important role in imparting skills that are required in the labour market and, by extension, for economic sustainability.

Occupational and employment status

Related to educational attainment, economic activity is an important correlate of chronic poverty. The study shows that 52 per cent of household heads from the sample median households were engaged in agriculture as a main economic activity and 3.2 per cent in the manufacturing sector. However, participating in agriculture as the main economic activity significantly increases the probability of being chronically poor. Conversely, households that were in formal employment (in wage employment) experienced neither persistent

poverty nor transitory poverty. This finding is consistent with that of Geda *et al.* (2001) and confirms the evidence that although Kenya is mainly an agricultural country, most of the population that is trapped in poverty is mainly engaged in agricultural activities.

Intuitively, while the importance of food security cannot be underscored, for the country to get those households currently trapped in poverty out of poverty, it is important to design interventions that enable households to obtain remunerative employment. Further, the problem of unemployment needs to be urgently addressed for Kenya to achieve meaningful reduction in poverty levels. The finding that manufacturing has a negative and significant impact on being non-poor could perhaps be attributed to the fact that median households engaged in the manufacturing sector were few, and could have been casual labourers and were, therefore, earning low income relative to the poverty line.

Ownership of physical assets

Another factor that contributes to chronic poverty is lack of physical assets, especially land and livestock. The results indicate that possession of assets such as livestock is negatively associated with chronic poverty, but this is mainly applicable to communities that depend on livestock as the main source of livelihood. Although a marginal increase in land ownership increases the probability of being non-poor, the effect is insignificant. This means that land ownership is not significantly associated with permanently escaping from poverty. This could be attributed to the fact that the land owned could be for agricultural activities, and since households engaged in agriculture have a high probability of being trapped in poverty, then any marginal increase in land ownership may not necessarily contribute to the probability of being poor over time.

Location of residence

Another factor that influences persistent poverty is location of the household's residence. Location of residence is closely correlated with economic opportunities available to households.

The evidence presented in Table 4.7 shows that although the probability of being always poor is 0.73 at national level, poverty is concentrated in rural areas, with the probability of being always poor for urban and rural areas being 0.50 and 0.77, respectively. However, the urban sample size was relatively small to enable us explore the contributing factors associated with poverty traps in urban

Table 4.7: Predicted probabilities of being non-poor, sometimes poor and always poor*

	Probability of being:		
	Non-poor	Sometimes poor	Always poor
National	0.0589	0.2124	0.7287
Rural	0.0467	0.1864	0.7610
Urban	0.1487	0.3484	0.5029

**Figures may not add up to 1 due to rounding up.*

informal settlements.

The marginal effects show that a change of residence from an urban to a rural area significantly increases the probability of being chronically poor. Consequently, if a household resides in a rural area, there is a higher likelihood that the household will be always poor, and the converse is true. Descriptive statistics show that out of the 1,090 households that were chronically poor, 89 per cent were residing in rural areas compared to 11 per cent residing in urban areas.

Marginal effects for rural and urban sub-samples are presented in Annex Tables A2 to A9. The results show that the poor are mainly residing in rural areas and have a higher probability of being always poor. This is probably due to the fact that the rural population is mainly engaged in agricultural activities, which also happens to be the main factor contributing to always being chronically poor (Tables 4.5 through 4.7 and Annex Tables A2 through A5).

It is evident that residing in Western Province increases the probability of being always poor compared to being in Nairobi Province. The marginal effects are consistent with the overall ordered logit results, as most of the variables have the same sign in most (national, rural and urban) sub-samples of the models estimated.

5. Conclusions and Policy Recommendations

5.1 Conclusion

This paper has used two different methodologies to decompose poverty into its chronic and transient components, first using the Jalan and Ravallion (1990) approach, where transient poverty is used as censored fluctuations, and second using the EDE poverty gaps approach. The analysis shows that there is divergence when using the two methodologies. For the same alpha, and poverty line, transient poverty dominates chronic poverty in the Jalan and Ravallion method, while chronic poverty dominates transient poverty in the EDE poverty gaps approach. These results are similar to those obtained by Duclos, Araar and Giles (2006) and Muyanga, Ayieko and Bundi (2007).

We also estimated an ordered logit model to determine the factors that are strongly associated with chronic poverty. The main factors correlated with chronic poverty include household size, education, asset ownership, and wage employment status. These factors are important for poverty reducing programmes that target the chronically poor. Households affected by chronic poverty were found to have large household sizes, lacked individuals with secondary and/or higher education, had no wage employed individuals, and/or had low asset ownership.

5.2 Policy Recommendations

a) In addition to government commitment to provision of universal primary education, it is important to adopt interventions for making post-primary education, especially secondary and tertiary education, more accessible as an important step for developing employable and skilled labour force.

b) The problem of unemployment should be adequately addressed because lack of wage employment is a main factor contributing to chronic poverty.

c) Livestock ownership increases the probability of being non-poor. Communities that mainly depend on livestock should

further be assisted to market their animal products as a source of income.

d) While employment in the manufacturing sector is expected to positively contribute to the probability of being non-poor, some of the labour force in manufacturing are trapped in chronic poverty. These are likely to be those in casual employment and low pay. Empowerment of low income earners in the manufacturing sector could include skills development to enable them secure middle level and better paying jobs.

e) Despite the fact that agriculture is important in food security, households mainly depending on agriculture are trapped in poverty. There is need for interventions to increase productivity in agriculture, and therefore improved incomes for farmers and, in effect, rural households.

f) Social protection programmes, including scaling up of the existing cash transfer schemes, should be developed to fight chronic poverty and develop appropriate safety nets such as food supplies and education grants for households that are likely to fall into poverty in the event of any shock.

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Annex

Table A1a: Definition of variables

Variable name	Variable definition
Poverty status	Poverty status is based on household consumption expenditure and estimated poverty level. The household with median income takes value 2 if below poverty line in both 1994 and 1997 (always poor); 1 if below poverty line in either 1994 or 1997 (sometimes poor); and 0 if above poverty line in both 1994 and 1997 (never poor). In ordered logit models, chronic=0 is the base outcome
Household characteristics	
Age of household head/age squared	Age of household head is the number of years completed by the time of the survey
Household size	Household size is the number of household members in median household
Primary education dummy	A dummy variable taking value 1 if individual has primary education, 0 otherwise
Secondary education dummy	A dummy variable taking value 1 if individual has secondary education, 0 otherwise
University education dummy	A dummy variable taking value 1 if individual has university education, 0 otherwise
Sex	Represents gender of household head, taking value 1 if male, 0 otherwise
Region of residence (rural or urban)	Represents region of residence taking value 1 if rural, 0 otherwise
Household's economic activities and characteristics	
Agriculture	Represents main household's economic activity, taking value of 1 if agriculture, otherwise 0
Manufacturing	Represents main household's economic activity, taking value of 1 if manufacturing, otherwise 0
Wage employment	Employment characteristics taking value 1 if wage employed, and 0 otherwise
Total cultivation land owned	Asset ownership in terms of cultivatable land area
Number of cattle owned	Number of cows owned

Table A1b: Ordered logit model results (national sample)

Chronic4	Coef.	Std. Err.	z	P>|z|
Age	-0.0064	0.0226	-0.2800	0.7770
Age2	0.00005	0.0002	0.2100	0.8350
Household size	0.1168	0.0241	4.8400	0.0000
sex*	-0.0238	0.1422	-0.1700	0.8670
Marital status polygamy*	-0.1266	0.1966	-0.6400	0.5200
Primary_1*	0.0387	0.1500	0.2600	0.7960
Secondary_1*	-0.3026	0.1750	-1.7300	0.0840
University_1*	-1.3013	0.4993	-2.6100	0.0090
Agriculture_1*	0.3063	0.1381	2.2200	0.0270
Manufacturing_1*	0.5210	0.3198	1.6300	0.1030
Wage employment*	-0.4636	0.1367	-3.3900	0.0010
Total land owned	-0.0056	0.0042	-1.3400	0.1800
Number of livestock (e.g. cows) owned	-0.0096	0.0043	-2.2100	0.0270
Rural urban	0.6229	0.1604	3.8800	0.0000
Central	0.7591	0.5623	1.3500	0.1770
Coast	0.7016	0.5642	1.2400	0.2140
Eastern	0.5886	0.5640	1.0400	0.2970
Nyanza	0.7091	0.5631	1.2600	0.2080
Rift Valley	0.0805	0.5567	0.1400	0.8850
Western	1.4200	0.5948	2.3900	0.0170
_cut1	-1.3413	0.7484		
_cut2	0.4415	0.7473		

Number of observations: 1,703; Log likelihood: -1213; Pseudo R^2=0.074

Pm_cpae

0 = Pr($\beta\chi + \alpha < \_cut1) = 0.0589$

1 = Pr(pr(_cut1< $\beta\chi + \alpha < \_cut2) = 0.2124$

2 = Pr(pr(_cut2<$\beta\chi + \alpha) = 0.0729$

Table A2: Ordered logit model results (rural sample)

Chronic4	Coef.	Std. Err.	z	P>|z|
Age	-0.0025	0.0255	-0.1000	0.9210
Age2	0.00001	0.0002	0.0400	0.9650
Household size	0.1348	0.0277	4.8700	0.0000
sex*	0.0817	0.1620	0.5000	0.6140
Marital status polygamy*	-0.3004	0.2140	-1.4000	0.1600
Primary_1*	-0.0219	0.1670	-0.1300	0.8950
Secondary_1*	-0.3423	0.2042	-1.6800	0.0940
University_1*	-1.2716	0.8210	-1.5500	0.1210
Agriculture_1*	0.3113	0.1472	2.1200	0.0340
Manufacturing_1*	0.0572	0.3745	0.1500	0.8790
Wage employment*	-0.5478	0.1580	-3.4700	0.0010
Total land owned	-0.0060	0.0043	-1.4100	0.1570
Number of livestock (e.g. cows) owned	-0.0102	0.0044	-2.3200	0.0200
Central*	-0.8359	0.3121	-2.6800	0.0070
Coast*	-0.9208	0.3418	-2.6900	0.0070
Eastern*	-0.9634	0.3231	-2.9800	0.0030
Nyanza*	-0.7896	0.3197	-2.4700	0.0140
Rift Valley*	-1.4887	0.3005	-4.9500	0.0000
_cut1	-3.3910	0.6838		
_cut2	-1.5652	0.6765		

Number of Observations: 1,430; Log Likelihood: -941.264; Pseudo R^2=0.0574

Pm_cpae: Monthly consumption per adult equivalent

0 = Pr($\beta\chi + \alpha < \_cut1$) = 0.0466

1 = Pr(pr(_cut1< $\beta\chi + \alpha < \_cut2$) = 0.1864

2 = Pr(pr(_cut2< $\beta\chi + \alpha$) = 0.7669

Table A3: Marginal effects model, probability of being non-poor (rural sample)

Variable	dy/dx	Std. Err.	Z	P>|z|
Age	0.0001	0.0011	0.1000	0.9210
Age2	-0.0000005	0.00001	-0.0400	0.9650
Household size	-0.0060	0.0013	-4.5800	0.0000
Sex*	-0.0037	0.0075	-0.4900	0.6210
Marital status polygamy*	0.0149	0.0118	1.2600	0.2080
Primary_1*	0.0010	0.0075	0.1300	0.8960
Secondary_1*	0.0168	0.0111	1.5100	0.1300
University_1*	0.1015	0.1033	0.9800	0.3260
Agriculture_1*	-0.0144	0.0072	-2.0100	0.0450
Manufacturing_1*	-0.0025	0.0159	-0.1600	0.8760
Wage employment*	0.0272	0.0090	3.0100	0.0030
Total land owned	0.0003	0.0002	1.4100	0.1600
Number of livestock (e.g. cows) owned	0.0005	0.0002	2.2800	0.0230
Central*	0.0473	0.0222	2.1300	0.0330
Coast*	0.0578	0.0291	1.9800	0.0470
Eastern*	0.0596	0.0269	2.2200	0.0260
Nyanza*	0.0452	0.0231	1.9500	0.0510
Rift Valley*	0.0937	0.0264	3.5500	0.0000

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Table A4: Marginal effects model, probability of being sometimes poor (rural sample)

Variable	dy/dx	Std. Err.	Z	P>|z|
Age	0.0003	0.0034	0.1000	0.9210
Age2	0.0000	0.0000	-0.0400	0.9650
Household size	-0.0181	0.0038	-4.8000	0.0000
Sex*	-0.0111	0.0221	-0.5000	0.6170
Marital status polygamy*	0.0421	0.0311	1.3500	0.1760
Primary_1*	0.0029	0.0224	0.1300	0.8960
Secondary_1*	0.0477	0.0295	1.6200	0.1050
University_1*	0.1851	0.1023	1.8100	0.0700
Agriculture_1*	-0.0423	0.0203	-2.0900	0.0370
Manufacturing_1*	-0.0076	0.0491	-0.1500	0.8770
Wage employment*	0.0764	0.0229	3.3400	0.0010
Total land owned	0.0008	0.0006	1.4100	0.1590
Number of livestock (e.g cows) owned	0.0014	0.0006	2.3100	0.0210
Central*	0.1202	0.0462	2.6000	0.0090
Coast*	0.1352	0.0511	2.6500	0.0080
Eastern*	0.1406	0.0479	2.9300	0.0030
Nyanza*	0.1142	0.0479	2.3900	0.0170
Rift Valley*	0.2095	0.0403	5.2000	0.0000

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Table A5: Marginal effects model, probability of being always poor (rural sample)

Variable	dy/dx	Std. Err.	Z	P>|z|
Age	-0.0005	0.0046	-0.1000	0.9210
Age2	0.0000	0.0000	0.0400	0.9650
Household size	0.0241	0.0049	4.9200	0.0000
Sex*	0.0148	0.0296	0.5000	0.6180
Marital status polygamy*	-0.0570	0.0428	-1.3300	0.1830
Primary_1*	-0.0039	0.0299	-0.1300	0.8960
Secondary_1*	-0.0645	0.0404	-1.6000	0.1100
University_1*	-0.2867	0.2046	-1.4000	0.1610
Agriculture_1*	0.0567	0.0273	2.0800	0.0380
Manufacturing_1*	0.0101	0.0650	0.1600	0.8770
Wage employment*	-0.1036	0.0314	-3.3000	0.0010
Total land owned	-0.0011	0.0008	-1.4100	0.1580
Number of livestock (e.g. cows) owned	-0.0018	0.0008	-2.3200	0.0200
Central*	-0.1675	0.0677	-2.4700	0.0130
Coast*	-0.1930	0.0795	-2.4300	0.0150
Eastern*	-0.2002	0.0739	-2.7100	0.0070
Nyanza*	-0.1594	0.0704	-2.2600	0.0240
Rift Valley*	-0.3031	0.0644	-4.7100	0.0000

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Table A6: Ordered logit model results (urban sample)

Chronic4	Coef.	Std. Err.	z	P>|z|
Age	-0.025	0.066	-0.380	0.703
Age2	0.0002	0.001	0.260	0.798
Household size	0.065	0.050	1.300	0.194
Sex*	-0.362	0.311	-1.160	0.246
Marital status polygamy*	0.637	0.507	1.260	0.209
Primary_1*	0.330	0.369	0.890	0.371
Secondary_1*	-0.055	0.371	-0.150	0.883
University_1*	-0.977	0.711	-1.370	0.170
Agriculture_1*	-0.492	0.535	-0.920	0.358
Manufacturing_1*	1.475	0.611	2.410	0.016
Wage employment*	-0.067	0.283	-0.240	0.814
Total land owned	-0.002	0.055	-0.030	0.976
Number of livestock (e.g. cows) owned	-0.001	0.052	-0.020	0.988
Central*	0.900	0.640	1.410	0.160
Coast*	0.987	0.614	1.610	0.108
Eastern*	0.691	0.631	1.100	0.273
Nyanza*	0.611	0.625	0.980	0.328
Rift Valley*	0.179	0.613	0.290	0.771
Western*	1.041	0.739	1.410	0.159
/cut1	-1.5728	1.39		
/cut2	0.16	1.39		

Number of observations: 273; Log likelihood: -262.248; Pseudo R^2=0.517

Pm_cpae: Montly consumption expenditure per adult equivalent

0 = Pr $(\beta\chi + \alpha < \_cut1)$=0.1487

1 = Pr(pr(_cut1< $\beta\chi + \alpha < \_cut2$) = 0.3484

2 = Pr(pr(_cut2< $\beta\chi + \alpha$) = 0.5029

Table A7: Marginal effects model, probability of being non-poor (urban sample)

Variable	dy/dx	Std. Err.	Z	
Age	0.0032	0.0083	0.3800	0.7030
Age2	-0.00002	0.0001	-0.2600	0.7970
Household size	-0.0083	0.0064	-1.3000	0.1950
Sex*	0.0426	0.0341	1.2500	0.2120
Marital status polygamy*	-0.0662	0.0430	-1.5400	0.1240
Primary_1*	-0.0409	0.0449	-0.9100	0.3620
Secondary_1*	0.0069	0.0474	0.1500	0.8830
University_1*	0.1650	0.1505	1.1000	0.2730
Agriculture_1*	0.0722	0.0901	0.8000	0.4230
Manufacturing_1*	-0.1193	0.0312	-3.8300	0.0000
Wage employment*	0.0083	0.0351	0.2400	0.8120
Total land owned	0.0002	0.0069	0.0300	0.9760
Number of livestock (e.g. cows) owned	0.0001	0.0066	0.0200	0.9880
Central*	-0.0912	0.0515	-1.7700	0.0770
Coast*	-0.1060	0.0563	-1.8800	0.0600
Eastern*	-0.0738	0.0566	-1.3000	0.1920
Nyanza*	-0.0672	0.0594	-1.1300	0.2580
Rift Valley*	-0.0217	0.0713	-0.3000	0.7610
Western*	-0.0959	0.0479	-2.0000	0.0450

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Table A8: Marginal effects model, probability of being sometimes poor (urban sample)

Variable	dy/dx	Std. Err.	Z	P>|z|
Age	0.0031	0.0081	0.3800	0.7040
Age2	-0.00002	0.0001	-0.2600	0.7980
Household size	-0.0081	0.0064	-1.2700	0.2050
Sex*	0.0473	0.0431	1.1000	0.2720
Marital status polygamy*	-0.0886	0.0750	-1.1800	0.2380
Primary_1*	-0.0415	0.0475	-0.8700	0.3820
Secondary_1*	0.0067	0.0454	0.1500	0.8820
University_1*	0.0638	0.0191	3.3500	0.0010
Agriculture_1*	0.0488	0.0390	1.2500	0.2110
Manufacturing_1*	-0.2027	0.0754	-2.6900	0.0070
Wage employment*	0.0083	0.0357	0.2300	0.8160
Total land owned	0.0002	0.0067	0.0300	0.9760
Number of livestock (e.g. cows) owned	0.0001	0.0064	0.0200	0.9880
Central*	-0.1244	0.0917	-1.3600	0.1750
Coast*	-0.1321	0.0845	-1.5600	0.1180
Eastern*	-0.0946	0.0912	-1.0400	0.2990
Nyanza*	-0.0827	0.0893	-0.9300	0.3550
Rift Valley*	-0.0229	0.0813	-0.2800	0.7780
Western*	-0.1465	0.1038	-1.4100	0.1580

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Table A9: Marginal effects model, probability of being always poor (urban sample)

Variable	dy/dx	Std. Err.	Z	P>|z|
Age	-0.0063	0.0165	-0.3800	0.7030
Age2	0.00005	0.0002	0.2600	0.7980
Household size	0.0163	0.0126	1.3000	0.1940
Sex*	-0.0898	0.0766	-1.1700	0.2410
Marital status polygamy*	0.1548	0.1164	1.3300	0.1830
Primary_1*	0.0823	0.0917	0.9000	0.3690
Secondary_1*	-0.0137	0.0927	-0.1500	0.8830
University_1*	-0.2288	0.1451	-1.5800	0.1150
Agriculture_1*	-0.1210	0.1274	-0.9500	0.3420
Manufacturing_1*	0.3220	0.1006	3.2000	0.0010
Wage employment*	-0.0166	0.0707	-0.2400	0.8140
Total land owned	-0.0004	0.0136	-0.0300	0.9760
Number of livestock (e.g. cows) owned	-0.0002	0.0129	-0.0200	0.9880
Central*	0.2156	0.1411	1.5300	0.1270
Coast*	0.2381	0.1382	1.7200	0.0850
Eastern*	0.1685	0.1464	1.1500	0.2500
Nyanza*	0.1499	0.1478	1.0100	0.3110
Rift Valley*	0.0445	0.1525	0.2900	0.7700
Western*	0.2424	0.1492	1.6200	0.1040

(*) dy/dx is for discrete change of dummy variable from 0 to 1