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000AIU Poverty

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ABBREVIATIONS

ANOVA	Analysis of Variance
CBS	Central Bureau of Statistics
FAO	Food and Agriculture Organization
GOK	Government of Kenya
IPRSP	Interim Poverty reduction Strategy paper
KEPIM	Kenya Participatory Impact Monitoring
MDGs	Millennium Development Goals
NASSEP	National Sample Survey and Evaluation Programme
PRSP	Poverty reduction Strategy Paper
SAPS	Structural Adjustment Programmes
WHO	World Health Organization
WMS	Welfare Monitoring Survey

RELATIONSHIP BETWEEN RURAL POVERTY AND AGRICULTURAL PRODUCTIVITY IN KENYA: *AN ANALYTICAL APPROACH*

1.0 Introduction

The CBS in the Economic Survey for year 2006, GoK (2006b) note that poverty is multi-dimensional and that its definition clearly depends on the perception of the society involved. Sarlo (2001) provide dictionary definitions of poverty as "without or lack of basic necessities or deprived of basic needs or simply without luxuries" but proceeds to question these very definitions. He observes that it is indeed difficult to specify poverty for practical distinction, for instance in the case of attempting to locate poverty in the continuum of living standards or quantifying the magnitude of deprivation.

The Kenya Participatory Impact Monitoring (KEPIM) (2005) provides definitions from various communities that include lack of access to productive assets, lack of access to social services, dependency and inability to participate and lack of access to basic infrastructure. Whether one perceives poverty as lack of necessities or as a particularly low position in the distribution of income, it is evident that poverty condition is known but difficult to generalize across societies or even countries. A more concise definition of poverty therefore accounts for the given society and the lack of basic necessities considered minimally decent.

The pursuance of Structural Adjustment Programmes (SAPS) in recent years has awakened most Governments, including Kenya's, to the increasing prevalence of rural poverty in their countries. In 2000, more than 45 percent of sub-Saharan Africa's population was estimated to be in poverty, and this situation has not improved in at least the last 15 years (World Bank, 2000). While efforts have been made to track poverty levels through standard welfare monitoring surveys and the computation of statistics on poverty prevalence, depth and severity, such information rarely provides insights for the design of specific anti-poverty programmes.

Rising poverty levels have prompted the international community to develop and seek consensus on internationally agreed development goals to be pursued by governments. This has led to the adoption of the International Development Goals and consequently the United Nations endorsed Millennium Development Goals (MDGs).

At the same time, multilateral lending agencies also developed their own version of development goals that focus on poverty alleviation strategies. As a result, loan recipient governments have been required to develop Interim Poverty Reduction Strategy Papers (IPRSP) as a prelude to more elaborate Poverty Reduction Strategy Papers (PRSP) that together with other requirements form The CBS in the Economic Survey for year 2006 GoK, (2006b) note that poverty is multi-dimensional and that its definition clearly depends on the perception of the society involved.

In order to fill this void, the Ministry of Finance through the PRSP secretariat and the Central Bureau of Statistics (CBS) have devised innovative systems to capture information pertinent to monitoring poverty over time. This system involves the development of monitoring and evaluation protocols and poverty mapping tools in areas experiencing high and severe poverty and the associated socio-

economic groups. The poverty mapping concept has been applied in the current welfare monitoring survey in Kenya but was limited to Nairobi and its environs.

The objectives of this paper are threefold: First, we measure the prevalence of rural poverty in 1997 and 2005. Second, we categorize households according to whether they were above the poverty line in both 1997 and 2005, entered into poverty or exited from poverty between 1997 and 2005, or were above the poverty line in both years. Third, the paper identifies the household-level and community-level factors associated with rural poverty through econometric analysis. Lastly, we consider the implications of these results for the design of appropriate poverty reduction strategies.

2.0 POVERTY AND WELFARE MEASUREMENT IN KENYA

Efforts to measure poverty and welfare in Kenya were initiated as early as 1972 by FAO using the Food Balance Sheet Studies. This was followed closely by the Integrated Rural Survey. Crawford and Thorbecke, (1975) which was the first documented attempt to estimate rural poverty in Kenya.

The core programme on poverty and welfare measurement has been the Welfare Monitoring Survey (WMS) series that were prompted by pursuit of Structural Adjustment Programmes (SAPs) reforms at the behest of the World Bank and International Monetary Fund in the late 1980's.

The WMS was an initiative to monitor the socio-economic effects of the SAPS and was designed to provide indications of the poverty levels within the country (GoK, 2006a).

From the absolute poverty line, other measures such as food poverty and "hard-core" poverty lines are derived and expressed in the same currency. Food poverty lines for rural and urban areas are obtained using a specific food basket of goods consumed per month per adult equivalence. Hard-core poverty, by contrast, refers to those households whose total incomes cannot cover their basic food requirements.

Food Poverty lines are shown in Table 1 below.

Table 1: Food Poverty Lines, in Kenya Shillings (Ksh) per person

	1992 WMS I	**1994 WMS II**	**1997 WMS III**
Rural	404.66	702.9	927.08
Urban	514.25	874.27	1253.9

Source: GoK, (2006b): Economic Survey 2006

2.1 Limitations of Poverty Estimation Methods

The standard critique of poverty estimation methods emanates from the use of household consumption expenditure and income as the basis of computation.

Household consumption expenditure based methods are more favoured due to the common argument that households generally smoothen their consumption and consequently it is less susceptible to fluctuations. It is also argued that consumption expenditures are easier to track and therefore it is more precise as a measurement.

However, it is recognized that there are major problems as to the composition of the basket of goods and the pricing of those goods. This basket of goods can be based on WHO defined adult equivalent nutritional requirements but the issue of which commodities to include will still vary from country to country and even within countries.

Income based poverty measures are considered less precise because it is known that income values are generally not exact considering suspicions that respondents express. Income based poverty measures are therefore difficult to estimate and are most likely to bias poverty levels upwards i.e. overstate poverty incidences.

A more general critique is derived from the approach taken by the World Bank of establishing international poverty lines. Since these poverty measures are based on purchasing power parity exchange rates and country poverty lines which form the background to the now common $1/day poverty line, they are extremely vulnerable to exchange rate variations. Deaton, (2001).

Poverty lines and the corresponding poverty incidences are further criticized owing to their static nature. The contention that these statistics are derived from household surveys, which are basically cross-sectional, implies that the statistics are less useful in measuring changes in household welfare over time. The inadequacy of household based poverty measures implies that the efforts of governments and other development agents in addressing poverty reduction cannot be easily validated i.e. in the absence of a dynamic poverty measurement tool, it is difficult to state or measure the impact of PRSP however short-term.

Other measures of welfare have been developed but they present even greater challenges in terms of measurement because some of the components are not amenable to quantification. In recent years, prominence has been given to these welfare measures such as Human Development Index (HDI) and Participatory Poverty Assessments which attempt to incorporate key aspects of human well being in the measurement yardstick.

These controversies over poverty measurements not withstanding, we have chosen to utilize the WMS poverty line as the basis of our analysis in modeling poverty dynamics. The Absolute Poverty line is used to estimate poverty incidence depth and severity through the methodology developed by Forster, Green and Thorbecke (FGT), Forster *et al* (1984).

Another welfare measurement of interest is the Gini Coefficient. Gini coefficients which shows the level of inequality in the distribution of resources within a population, and range from zero (complete equality of income across all households) to one (extremely concentrated distribution of income). These computations are, in most cases static and do not therefore reveal issues that are inherently dynamic. It is consequently, expected that the examination of changes in the level of inequality as measured by income Gini Coefficients should be more informative.

2.2 Poverty Dynamics

It has become increasingly evident that the poor are indeed heterogeneous and that some element of dynamics does exist (Barrett, 2003). These developments have led to a scrutiny of poverty as determined by the duration spent under poverty. Further enquiries have been made to establish the determinants of exit or entry into poverty. Stevens, 1995; Davis and Stampini, (2002).

These developments have resulted in further categorization of poverty into chronic and transitory. Chronic poverty is considered to be the component of total poverty that is static and transitory poverty is the component that is attributable to intertemporal variability. Jallan and Ravallion, (1996). The isolation of the process underlying chronic and transitory poverty is considered essential in understanding the extent to which each poverty type may obscure the other or even distort the effects of government anti-poverty programmes.

Aliber (2001) emphasizes that chronic poverty exists when a household's or individual's poverty condition endures over a given duration. The specific duration that defines chronic poverty varies and depends on the available data, Researchers and analytical tools employed. The concept of chronic poverty has been expanded to include households/ individuals unable to emerge from poverty or lacking opportunities to improve their circumstances. Okidi (2002). Bird and Shepherd (2003) extend chronic poverty analysis by pursuing the relationship that exists between poverty and remote rural areas especially the effects of political exclusion. Stevens (1995) examine the persistence of poverty over individuals lifetimes through a hazard rate (spells) approach and a variance component model. These approaches are considered an improvement over the Bane and Ellwood (1986) study since they take into consideration multiple spells of poverty rather than focusing on a single spell.

Bigsten *et al* (2003) and Hadad and Ahmed (2003) provide an insight into transitory poverty by examining the characteristics of households that exit or enter poverty. Similarly, the pathways out of poverty were studied by Davis and Stampini (2002) and Krishna *et al* (2003).

McCulloch and Baulch (2000) provide a simulation of the impact of policy upon chronic and transitory poverty although they utilize the squared poverty gap measure which is more suited to severity rather than poverty levels. They conclude that different anti-poverty interventions may be needed to address chronic and transitory poverty.

It is evident that the analysis of poverty dynamic constitutes a significant aspect in understanding the persistence of poverty by providing the defining characteristics of those who remain persistently poor. This distinction and characterization is particularly useful in developing/designing government anti-poverty programmes.

3.0 PANEL DATA DESCRIPTION

The panel data used in the analysis was obtained through rural household surveys conducted in 1997 and 2006. These surveys covered 1441 households in both 1997 and 2006.

4.0 ESTABLISHING POVERTY CATEGORIES

Incomes from farm and non-farm sources were computed from the 1997 and 2006 rural household survey data. The 1997 poverty line was then inflated to 2006 levels to compute a new poverty line for 2006.

The WMS poverty line for 1997 and the 2006 computed poverty line were utilized to establish rural households below and above the poverty line for 1997 and 2006 respectively. The rural income poverty

incidence for 1997 was found to be 58% while that for 2006 was 61%. The computed rural income poverty incidences appear to be consistent with the widely held perception that poverty levels in the country have been increasing during the study period particularly in view of the loss of non-farm income from retrenchment programmes in the civil service and parastatals. The private sector also shrunk at the time due to capital flight, reduced capital inflows and relocation of investors attributed to the unfavourable economic and political climate.

Poverty categories were developed from the panel sample of rural households using a modified spell in poverty approach and defined as follows:

i) *Chronically poor* refers in this study to those households that fell below the poverty line in both 1997 and 2006. Our use of the term here does not imply that these households are necessarily consistently poor year in and year out, as we lack the multiple years of panel data required to determine this.
ii) *Transitorily poor* refer to those households that fell below the poverty line in either 1997 or 2006 but in not in both periods.
iii) *Non-poor* characterize those households that did not fall below the poverty line in either year (1997 and 2006).

The foregoing categorization produced the results indicated in table 2 below.

Table 2: Poverty Categories

	Frequency	Percent
Non poor	470	33.7
Transitory poor	433	30.1
Chronic poor	535	37.2
Total	1438	100.0

On the whole it appears the income poor constitute a very large proportion of the rural households. The chronic poor form the largest proportion of the rural households at 37% compared to the other categories. This is in contrast to other developing countries with similar economic status. Hadad and Ahmed, (2003); Dercon and Krishnan, (2002).

However, our understanding of "poverty dynamics", e.g., the extent to which poor households in one year remain poor in subsequent years as opposed to moving out of poverty, has not received commensurate attention from either the PRSP secretariat or the CBS. This can partly be attributed to the lack of appropriate panel data that tracks the poverty status of rural households over time in Kenya. This has also inhibited the ability to understand the reasons why some households that are below the poverty line in one period are able to climb out of poverty in subsequent periods, while others remain chronically mired in poverty. It should be noted that this problem is not peculiar to Kenya and is exhibited in a number of countries. Even the World Bank, which is renowned for its

eminent work in the area of poverty dynamics, has little relevant information on Kenya. The PRSP monitoring and evaluation exercise and the CBS poverty mapping process can be complemented by rigorous analysis of panel data to provide gainful insights into the dynamics of poverty in Kenya through the analytical methods utilized in this study.

As stated earlier, the objectives of this paper are threefold: First, i measure the prevalence of rural poverty in 1997 and 2006, based on the nationwide survey. Second, i categorize households according to whether they were above the poverty line in both 1997 and 2006, entered into poverty or exited from poverty between 1997 and 2006, or were above the poverty line in both years. Third, the paper identifies the household-level and community-level factors associated with rural poverty through econometric analysis. Lastly, i consider the implications of these results for the design of appropriate poverty reduction strategies.

Results, displayed in Tables 3a and 3b, indicate a high degree of correlation among all indicators, all of which are significantly related at the 1 percent level of significance. However, as might be expected, the three income-based measures show a particularly high degree of correlation, whereas the Spearman correlation coefficient between the household asset variable and the household income variables are in the range of 0.44 to 0.45. For comparability with previous studies in Kenya, our analysis proceeds on the basis of the income measures, keeping in mind the partial degree of correlation between these measures and asset levels.

Table 3a. Correlation Coefficients of Indicators of Household Welfare, 1996/97 Season

	Total household income	Per capita household income	Household cash income
Per capita household income	.916		
Household cash income	.985	.908	
Total value of household assets	.553	.513	.515

Source: derived from the CBS household surveys, 1996/97, and 1999.06

Table 3b. Correlation Coefficients of Indicators of Household Welfare, 1999/06 Season

	Total household income	Per capita household income	Household cash income
Per capita household income	.877		
Household cash income	.977	.866	
Total value of household assets	.530	.460	.530

Source: derived from the CBS household surveys, 1996/97, and 1999.06

4.1 Spatial Distribution of Poverty Categories

Since the categorization of poverty into "chronic," transitory and non-poor as above was performed without reference to either agro-ecological zones or the administrative districts, it is imperative to examine their distribution within these locations. The spatial distribution of poverty by agro-ecological zones is therefore shown in Table 4 below.

Table 4: Distribution of Poverty Categories within Agro-ecological zones.

Zone		**Non poor**	**Transitory poor**	**Chronic poor**	**Group Total**
Coastal Lowlands	Count	12	40	27	79
	Percent within zone	15.2	50.6	34.2	100.0
Eastern Lowlands	Count	57	55	44	156
	Percent within zone	36.5	35.3	28.2	100.0
Western Lowlands	Count	16	39	120	175
	Percent within zone	9.1	22.3	68.6	100.0
Western Transitional	Count	37	69	59	165
	Percent within zone	22.4	41.8	35.8	100.0
High Potential Maize Zone	Count	151	94	140	385
	Percent within zone	39.2	24.4	36.4	100.0
Western Highlands	Count	15	43	81	139
	Percent within zone	10.8	30.9	58.3	100.0
Central Highlands	Count	166	61	31	258
	Percent within zone	64.3	23.6	12.0	100.0
Marginal Rain Shadow	Count	11	21	16	48
	Percent within zone	22.9	43.8	33.3	100.0
Group Total	Count	465	422	518	1405
	Percent within zone	33.1	30.0	36.9	100.0

Except for Central Highlands, all the other zones record chronic poverty levels well above 25%, which implies that chronic poverty is predominant in the country. Western lowlands, , Western Lowlands and Western highlands record the highest levels of chronic poverty whereas transitory

poverty is spread out over all the zones. The observation here is that poverty is not confined to specific zones irrespective of the agricultural potential of the area (zone).

To examine the spatial pattern of income poverty, we regress per capita incomes on geographic categorical variables of varying size. This is equivalent to an ANOVA test measuring the extent of inter-zone vs. intra-zone variation. When provincial-level dummy variables are used, the R^2 of these models is 0.06, indicating that roughly 94% of the variation in per capita incomes across these 1,400 rural households is explained by differences within the provinces rather than between them. When smaller geographic variables (districts) are used, the R^2 of these models only rises to the range of 0.14. And when using the smallest administrative unit available in the data set (villages), the R^2 of these models indicates 23.5% of the variation in per capita incomes across the sample can be explained by differences between villages. By far the most important factors associated with the variation in per capita incomes across the households in the sample are not related to village-specific factors such as rainfall, soil types, market access, etc. We believe that this is an important finding that is somewhat in conflict with conventional wisdom. There are indeed significant regional differences in incomes as shown in Table 6. But despite such regional differences, the largest source of variation in household incomes is to be found within villages, i.e., poverty is primarily an intra-village phenomenon which demands strategies that identify and take into account household-level resources and characteristics.

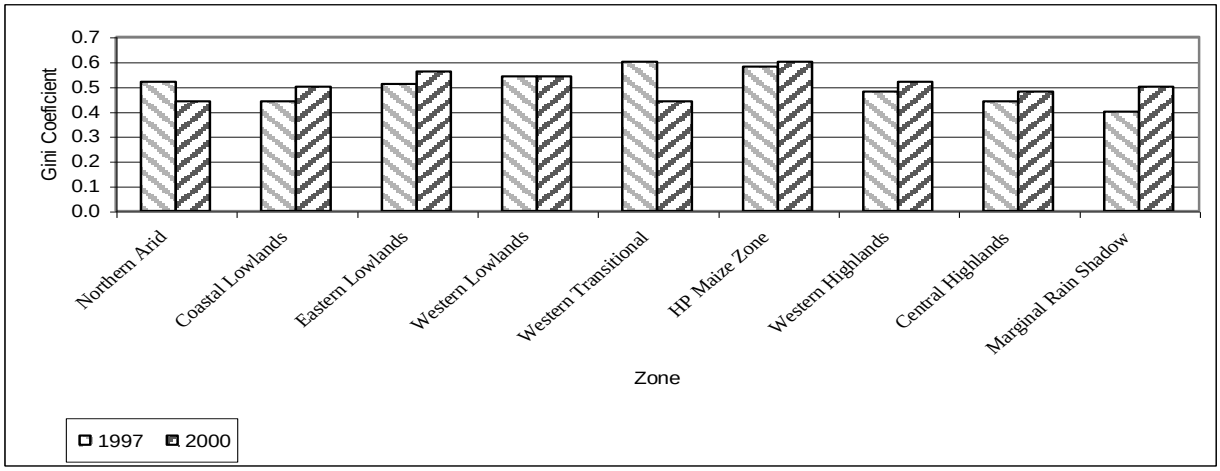
The presence of both transitory and chronic poverty in all areas of the country also implies that successful poverty reduction strategies must be developed to account for these two different types of poverty.

5.0 INCOME INEQUALITY

To examine the income distribution more carefully, we present various Gini coefficient estimates from the household data. According to Deininger and Squire (1996), the average income Gini coefficient in Sub-Saharan Africa, based on 40 surveys that passed their data-quality criteria, is 0.45, while it is 0.50 in Latin America, where income inequalities are generally considered to be relatively severe. We find Gini coefficients of 0.52 for Kenya in 1997 and 0.55 in 2006. This is considerably higher than the 0.37 Gini coefficient reported for Kenya's rural areas by Haggblade and Hazell (1988) in the 1970s. Moreover, the current Gini estimates from our sample are also generally higher than Haggblade and Hazell's estimates for rural Asia from the 1960s and 1970s. This might be considered especially surprising given that our sample is confined to the small-scale farming sector and does not even count the large-scale farming sector. From these comparisons, it appears that the distribution of rural income appears to have widened over the past two decades, although differences in survey design and samples warrant caution in these comparisons. But at least there is *prima facie* evidence that income distribution may be worsening in these countries over time, and that rural income distribution is actually worse in Kenya in the late 1990s than in most of Asia at the time of the green revolution there.

We next examine income inequality within each agro-ecological zone studied as measured by the Gini Coefficients. The gini coefficients for each year are shown in Figure 1:

Figure 1: Gini coefficient for agro-ecological zones



The zone Gini coefficients are lower than that for the nationwide sample except in western lowlands and Hp maize zones. This is because some of the income variation across zones is eliminated with examining inequality only within a given zone. Yet the level of income inequality within zones still appears to be quite high. The lowest Gini coefficient in 1997 is recorded by the Marginal Rain Shadow at 0.40 and Central Highlands at 0.44. Both years show high levels of income inequality with the highest level in 1997 and 2006 being in Western Transitional and High Potential Maize Zone respectively.

Figure 1 also reveals a worrying trend in that the income inequality for the agro-ecological zones shows an upward trend from 1997 to 2006. Except for Northern Arid and Western Transitional zones all the other zones record higher Gini coefficients in 2000 compared to 1997.

Western lowland zone did not experience change in Ginni coefficient. Though the coefficient remained high in both years, it was the same for both 1997 and 2000.

6.0 POVERTY AND ACCESS TO RESOURCES

6.1 Poverty and Access to Human Capital (Education)

Human capital in the form of education and skills contribute to poverty reduction efforts by providing the tools to identify and exploit economic opportunities. Bruno et al, (1998); World Bank (2000). Marenya *et al* (2003) also find a strong relationship between education, non-farm income and farm investments that over a long period of time contribute to significant reduction in poverty levels in western Kenya. It is however noted that the effects of investments in human resource development on poverty is manifested only in the long term, and thus should be viewed as a potential means to alleviate chronic poverty. Transitory poverty alleviation requires other types of public policy interventions.

The relationship between poverty and education distinctly emerges from the CBS household survey data as shown in Table 5. The relationship between chronic poverty categories and years of education of the most highly educated adult member of the household is strongly inversely correlated. For example, over 60% of the households whose household head had no primary school education were below the poverty line in both 1997 and 2006. By contrast, less than 20% of the households that had household head with education beyond Form 4 were chronically poor. The major turning point at which education levels are associated with sharp reductions in chronic poverty occurs at fourth form level. It is instructive that this relationship is exhibited in both the 1997 and 2006 data.

Table 5: Comparison of Poverty Categories by Education in 1997

		NON POOR	**TRANSITORY POOR**	**CHRONIC POOR**	**TOTAL**
None	Count	6	8	15	29
	Percentage	20.7	27.6	51.7	100.0
Primary unfinished	Count	51	69	161	281
	Percentage	18.1	24.6	57.3	100.0
Finished primary	Count	96	109	158	363
	Percentage	26.4	30	43.5	100.0
Some Secondary	Count	66	79	95	240
	Percentage	27.5	32.9	39.6	100.0

Form 4	Count	177	131	90	398
	Percentage	44.5	32.9	22.6	100.0
Form 6 / Post secondary	Count	63	32	14	109
	Percentage	57.8	29.4	12.8	100.0
1st degree and above	Count	11	5	1	17
	Percentage	64.7	29.4	5.9	100.0
Total	Count	470	433	534	1437
	Percentage	32.7	30.1	37.2	100.0

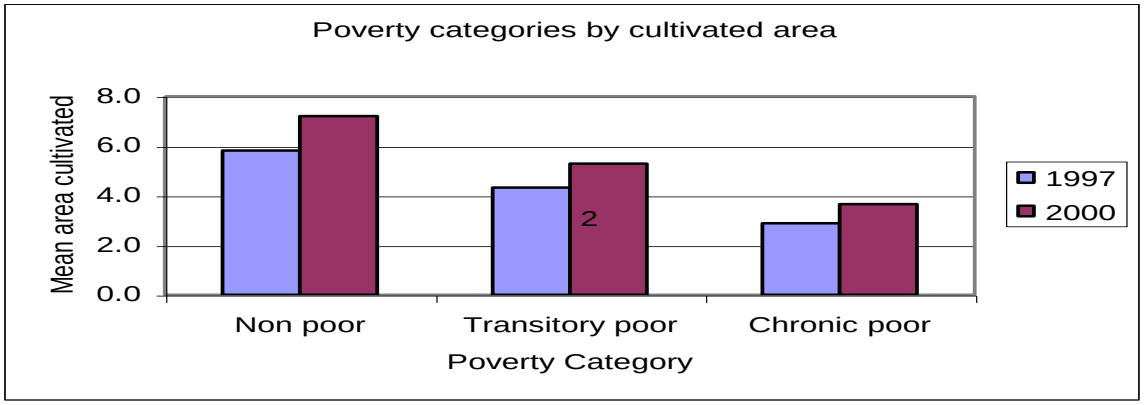
Source: CBS Household Surveys, 1997.

6.2 Poverty and Access to Land

Emerging evidence suggests that the poverty reducing effects of economic growth are influenced by the initial distribution of assets and the more general issues of inequality. For example, Ravallion and Datt (2002) found that the initial percentage of landless households significantly affected the elasticity of poverty to non-farm output in India. In a sample of 69 countries. Gugerty and Timmer, (1999) found that, in countries with an initial "good" distribution of assets, both agricultural and non-agricultural growth benefited the poorest households slightly more in percentage terms. In countries with a "bad" distribution of assets, however, economic growth was skewed toward wealthier households, causing the gap between rich and poor to widen. It is especially noteworthy that in this latter group of countries, agricultural growth was associated with greater increases in inequality than was non-agricultural growth. This reverses what has been considered the more typical pattern, wherein agricultural growth is seen to contribute more to poverty reduction than growth outside the agricultural sector. These findings reinforce the idea that where access to land is highly concentrated and where a sizable part of the rural population lack sufficient land or education to earn a livelihood, then special measures will be necessary to tackle the problem of persistent poverty. Ravallion, (1997).

An examination of access to land by the different poverty categories in Kenya indicates that the area of land cultivated is strongly associated with household per capita income. Figure 2 shows that in both 1997 and 2006 the chronic poor cultivated less land.

Figure 2: Poverty Categories by Cultivated Area



Source: Tegemeo Household Surveys, 1997 and 2006.

It is well recognized that severe land inequalities persist between Kenya's small-scale and large-scale farms. Yet the smallholder farm sector is typically characterized as small but relatively "unimodal" and equitably distributed land holdings situated within a "bi-modal" distribution of land between large-scale and small-scale farming sectors. Redressing these inequalities is likely to be an important element of an effective rural poverty reduction strategy in countries such as Zimbabwe and Kenya. Yet despite widespread acceptance that "pro-poor" agricultural growth is strongly associated with equitable asset distribution, little attention has been devoted to quantifying land distribution patterns within Kenya's small-scale farming sector.

Nevertheless, it is possible that the bottom land quartile may contain mostly "Sunday farmers" who are engaged primarily in off-farm activities for their livelihoods. To examine this possibility, we compute income shares from crop production, animal and animal-derived production, and off-farm income for each land quartile (Table 5). As expected, off-farm income shares are highest for the bottom land quartile and decline as landholding size rises. However, households in the bottom land quartile earn 50% of their total income, on average, from agriculture, despite their very small farms. The Ginis are comparable to those estimated for much of Asia during the 1960s and 1970s. Haggblade and Hazell, (1988). If land is allocated according to household size or labor availability, we should find more equal land distribution in household *per capita* or *per adult* land holdings than *per household* land holdings. This would imply that the Gini coefficients of land holding by per capita and per adult measures should be smaller than those of landholding per household. However, this is not the case, as can be seen in Table 8. The Gini coefficients of landholding size are virtually unchanged after accounting for family size in the estimates of land distribution inequality.

Our point in highlighting the low explanatory power of these models is to show that most of the variation in household per capita landholding size within the smallholder farm sector must be contained in factors other than village-level differences and observed household level differences in assets and socio-demographic characteristics. Research in other disciplines has highlighted the importance of the period of the clan's settlement in a particular area in determining land allocated to the clan, which is subdivided among families within the clan Kajoba, (1994); Block and Foltz, (1999). Late migrants into an area typically are eligible for relatively small tracts of land for

subdivision within the areas controlled by their clans. Marrule (1998) argues that kinship ties and power relationships within traditional governance structures also partially explain the observed disparities in land allocation, variables that are not included in these models. These hypothesized processes are related to the recently emerging literature on kinship ties, trust, and social capital (e.g., Fafchamps, (1992); Platteau, (1994); Gabre-Madhin, (2001). In an attempt to test these hypotheses, These emerging findings lead us to speculate that, more generally, there may be important institutional and governance factors operating within local systems for allocating land that may be accounting for at least some of the unexplained variation in per capita landholding size within the smallholder farm sector.

The importance of these findings for rural growth and poverty alleviation strategies depends in part on the degree to which land allocation patterns influence household income and poverty. If non-farm activities are able to compensate for small landholdings and provide land-poor households with adequate alternative income sources, then disparities in land ownership should not necessarily be a policy problem. However, as we will examine in more detail later, the relationship between households' off-farm income, total income, and landholding size is very strong.

Table 6. Smallholder Land Distribution in Kenya , 1997 and 2000.

	(a)	(b)	(c)					(d)	(e)		
	sample size	Ave. landholding size including rented land	Household Per Capita Land Access					RELGAP[1]	Gini Coefficients		
			Ave.	Quartile 1					Land per household	Land per capita	Land per adult
				1	2	3	4				
		– ha –	– ha –	– ha –							
1997	1,380	2.65	0.41	0.08	0.17	0.29	0.73	1.59	0.55	0.56	0.54
2000	1,345	2.59	0.40	0.07	0.16	0.27	0.76	1.73	0.56	0.57	0.55

[1] RELGAP is the difference in mean land size between the first and fourth quartiles divided by the mean.

Source: Tegemeo Household Surveys, 1997 and 2000.

6.3Education and cultivated area

The area cultivated by level of education of the household head is shown in Table 7. The overall trend seems to suggest that the area cultivated increases with the level of education attained by the household head. For now, we can only speculate about the direction of causality: do more educated households cultivate more land because they are more entrepreneurial and skilled, or are wealthier households with relatively large farms able to educate their members better? While the direction of causality is likely to flow in both directions, ongoing research is attempting to examine the entry points for poverty alleviation policy. At this stage, we simply note that education seems to be positively correlated with several important indicators of household welfare, and that raising poor children's' access to education is likely to have beneficial effects on poverty alleviation and income distribution over the long run.

Table 7. Household Head Education by Mean Cultivated Area

	1997	2000
	Acres	Acres
None	4.70	4.69
Primary unfinished	3.81	5.09
Finished primary	4.24	5.39
Some Secondary	3.88	5.11
Form 4	4.49	5.11
Form 6 / Post secondary	5.95	6.44
1st degree and above	6.69	6.90
Table Total	**4.82**	**5.54**

Additional insights can be obtained by examining income levels disaggregated by the type of income, by education and landholding size categories. We rank all households in the sample by education of the most highly educated adult member, and by landholding size, and then create three education categories (low, medium and high) and four landholding size categories. The mean years of education of the three education terciles are 0.4? or0.26? years, 5.4 years, and 10.8 years. The mean landholding sizes of the four land quartiles are 0.08, 0.17, 0.29, and 0.73 hectares per capita.

Table 10 shows the income levels (by source of income) for each of the 12 groups. Within each landholding size quartile, we find that mean per capita incomes are substantially higher for households in the highest education tercile than those in the first education tercile. This strengthens our earlier observations about the contribution of education to poverty alleviation, because these results persist even after holding landholding size relatively constant.

The results in Table 8 also show that per capita incomes rise substantially with each landholding size quartile. Households with highly educated member (mean 10.4? or 10.8?

Table 8. Income Levels and Sources of Rural Households in Kenya, by Education and Landholding Size Category, 1997 and 2000 pooled

	Quartiles of Households Ranked by Landholding Size Per Capita											
	Smallest (mean 0.08 ha per capita)			**Second Quartile (mean 0.17 ha per capita)**			**Third Quartile (mean 0.29 ha per capita)**			**Highest (mean 0.73 ha per capita)**		
Education Group* (1=lowest; 3=highest):	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
sample size (n)	130	153	97	101	135	144	100	129	149	124	122	133
land access (average for 97 and 00)	0.41	0.55	0.58	1.06	1.17	1.17	1.49	1.90	1.87	3.73	3.77	3.78
land access per capita	0.06	0.08	0.08	0.17	0.17	0.17	0.29	0.29	0.29	0.81	0.68	0.72
female headed households (%)	12.31	13.07	7.22	30.69	13.33	5.56	17.00	17.83	7.38	25.81	17.21	3.76
Per capita income	162.02	142.56	234.63	158.90	238.70	281.17	285.77	258.38	362.61	363.25	466.76	468.50
crop income share (%)	27.60	31.14	28.06	35.64	39.04	32.24	31.44	42.71	36.62	43.22	45.56	35.11
livestock prod income share (%)	30.79	17.41	14.74	18.76	18.80	16.56	22.63	15.79	14.48	25.66	22.42	21.76
off-farm income share (%)	41.61	51.45	57.20	45.60	42.16	51.20	45.93	41.50	48.91	31.12	32.02	43.13
Of which: remittances	4.52	4.27	2.08	5.50	3.45	4.83	5.58	4.50	3.95	4.44	5.51	4.26
business income	15.37	16.66	18.42	16.13	18.56	13.57	16.53	15.80	12.01	14.45	13.71	10.30
non-ag wage labour	19.49	28.27	34.78	22.78	18.46	32.23	22.81	20.45	32.62	11.59	11.55	28.23
ag-wage labour	2.23	2.25	1.93	1.19	1.68	0.56	1.00	0.75	0.34	0.65	1.25	0.33
Crop income per hectare (US$)	554.99	597.99	820.67	345.00	560.44	551.35	304.90	386.89	467.79	211.75	322.04	260.81

data.

Note: Mean years of education of the most highly educated adult member: Group 1 (0.26? or 0.4? years); Group 2 (5.4 years); Group 3 (10.8? 10.4? years).

Source: Tegemeo Household Surveys, 1997 and 2000.

years of education) had lower per capita incomes as a group than households with adults possessing less than one year of education but in the third or fourth landholding size quartiles. In short, the greater land resources of these households allowed them to out-earn the land-constrained households with adults possessing 10 more years of education. These results show the predominant association between constrained landholding size and rural poverty.

The results in Table 10 also indicate how the sources of income change as education varies within each landholding size category. As education increases (from education group 1 to group 3), the income share of crops remains roughly constant, and the income share of livestock products declines. Among the most land constrained landholding quartile, the biggest difference between the most and least educated households is the share and magnitude of off-farm income – non-agricultural wage labour in particular. These results suggest that for households with inadequate access to land to earn a livelihood from agriculture, education is a major pathway out off poverty. Although it is a pathway that pays off only in the long-term, increased public investment now is likely to reap tangible benefits for poverty reduction 10-20 years down the road and for Kenya's long term development prospects.

6.4 Poverty and gender

Table 10. Mean Household Incomes by Gender of Household Head

	1997	**2006**
Male	130,526.5	164,892.6
Female	94,963.9	108,103.0

Differences in land access and education appear to be accounting for part of the income disparity between male-headed and female headed households. Jayne et al., (2003) found that female-headed (unmarried) households in Kenya have, on average, 1.03 hectares less land than male-headed households, which is a huge relative difference considering that mean farm size for the entire sample is 2.65 hectares. Female-headed households in which a male partner resides off-farm also tend to have less land than male-headed households, although the effect is weaker than for female-headed unmarried households. We also see in Table 10 that a much higher percentage of female-headed households fall into the lowest education category in every landholding size group.

6.5 Poverty and Land Tenure

As shown in Table 11, the proportion of households owning land with title deeds is inversely related to poverty, and the proportion of households owning land without title deed is positively related to poverty. The more common reason for this phenomenon is that the cost of processing land titles is prohibitively high and consequently inhibits the participation of the poor in land registration.

Table 11 Poverty Categories By Land Tenure in 1997

	Non-poor		Transitory poor		Chronic poor		Total	
	Freq	Col%	Freq	Col%	Freq	Col%	Tot Row	Tot Row%
Owned with title deed	249	39.3	183	28.9	202	31.9	634	100.0
Owned without title deed	163	28.7	174	30.7	230	40.6	567	100.0
Rented	6	31.6	10	52.6	3	15.8	19	100.0
Owned by parent/relative	50	25.9	58	30.1	85	44.0	193	100.0
Government/communal land/others	1	4.8	8	38.1	12	57.1	21	100.0
Total	469	32.7	433	30.2	532	37.1	1434	100.0

It is generally acknowledged that the easing of land title processing presents a dilemma for it can either result in reduced poverty levels or increased destitution. Where the proceeds from land sales are invested well the result could be reduction in levels of poverty but where it is not then the poverty levels are aggravated. The common observation is that the later case often prevails.

6.6. Poverty and Agricultural Credit

A larger percentage of the non-poor (42%) received agricultural credit compared to the transitory poor (27%) and chronic poor (16%) in 1997. The same trend was repeated in 2000. There is however a slight increase in those who receive agricultural credit within each category as shown in Table 12 below.

Table 12. Poverty categories by agricultural credit

		1997		2006	
		Number	Percent	Number	Percent
Non poor	Received credit	195	41.5	261	56.1
	No credit	275	58.5	204	43.9
		470	100.0	465	100.0
Transitory poor	Received credit	123	28.4	218	51.1
	No credit	310	71.6	209	48.9
		433	100.0	427	100.0
Chronic poor	Received credit	86	16.1	214	40.1
	No credit	448	83.9	320	59.9
		534	100.0	534	100.0

The pattern exhibited above brings to the fore the need to restructure the agricultural credit system to be more responsive to the needs of the rural poor. Only about 20 percent of the chronic poor -- *who probably need credit the most* -- are able to access it. This suggests that the existing agricultural credit system is unfavourable to the poor, and that efforts to develop financial products that suit the needs of relatively poor small-scale farmers may have higher payoffs both in terms of poverty alleviation and rural equity. However, this will need to be done in a way that does not erode the incentives to lenders. Suppliers of loan money base their lending decisions on the expected returns and risks of potential clients. The poor generally represent greater risk of default because they have less residual assets to draw on if weather vagaries make it difficult to repay loans through the sale of crop/livestock production. There is potentially a useful role for the public sector to provide loans to farmers who meet certain poverty-based criteria, but the main challenge here is how to ensure high loan repayment and avoid strategic default to maintain the sustainability of the system.

A further disaggregation of those who received agricultural credit by agro-ecological zone and poverty category shows that the majority of those who received agricultural credit among both the non-poor and the transitory poor are located in the Central Highlands and High Potential Maize Zones – the most productive agricultural areas of the country. Among the chronic poor, Western Highlands had the highest percentage of those receiving agricultural credit (Table 13). The Coastal and Western Lowlands have the lowest percentage of those receiving agricultural credit within the zone.

Table 13: Received credit by zone and poverty categories in 1997

	Non poor	**Transitory poor**	**Chronic poor**	**Total**
	% of households receiving ag. credit			
Coastal Lowlands	0.5	3.3	2.3	1.7
Eastern Lowlands	6.7	8.9	11.6	8.4
Western Lowlands	1.5	1.6	4.7	2.2
Western Transitional	8.7	19.5	10.5	12.4
High Potential Maize Zone	15.4	16.3	15.1	15.6
Western Highlands	4.6	16.3	36.0	14.9
Central Highlands	62.1	33.3	19.8	44.3
Marginal Rain Shadow	0.5	0.8		0.5
Total	100.0	100.0	100.0	100.0

Source: Tegemeo Household Surveys, 1997

Poverty and Nominal Crop Land Productivity

Crop land productivity was computed using crop income and area cultivated for each of the poverty categories for 1997 and 2000.

Table 14: Poverty Category by Mean Crop Land Productivity

Poverty Categories	**Mean Crop Land Productivity (Kshs)**	
	1997	**2000**
Non-Poor	105,422	142,941
Transitory Poor	43,992	79,684
Chronic Poor	20,314	29,525

The above figures suggest that there is some potential for poverty reduction through improved crop productivity.

Nominal mean crop land productivity was also computed for the different agro-ecological zone and is shown in the table 15 below.

Table 15: Mean Crop Land Productivity in Kshs.

	1997	2000
Coastal Lowlands	14,475.35	41,041.49
Eastern Lowlands	30,533.61	70,085.56
Western Lowlands	16,544.12	24,791.10
Western Transitional	53,324.17	110,807.30
High Potential Maize Zone	94,187.68	93,609.26
Western Highlands	25,400.79	65,781.65
Central Highlands	80,916.79	125,373.2
Marginal Rain Shadow	19,808.99	15,864.96

The crop productivity figures appear to correspond to the poverty levels experienced in the agro-ecological zone. High Potential Zone, Central Highlands and Western Transitional have the highest crop land productivity and also have the lowest chronic poverty as compared to Western Lowlands, Eastern Lowlands and Marginal Rain Shadow.

Crop land productivity also increases with increasing levels of education of the household head particularly for the year 2006 where a clear picture emerges as shown in table 16.

Table 16: Productivity by Household Head Education

	1997	2000
None	55,621.27	58,380.94
Primary unfinished	47,352.37	76,524.18
Finished primary	50,993.84	85,066.58
Some Secondary	49,286.54	83,292.34
Form 4	69,215.65	81,328.08
Form 6 / Post secondary	87,484.81	107,407.90
1st degree and above	109,320.10	135,995.00

7.0 RURAL POVERTY DYNAMICS

To gain an insight into rural poverty dynamics, the transitory poor are further disaggregated into those entering poverty and those exiting poverty. This sub-categories of poverty are isolated by identifying those who were above the poverty line in 1997 but fell below the poverty line in 2006 (entry) and those who were below the poverty line in 1997 but were above it in 2006 (exits).

In order to provide a complete perspective of poverty dynamics, the distribution of all the categories and sub-categories within the agro-ecological zones is shown in table 17.

Table 17: Poverty Dynamics by Zone

		Non-poor in both years	Exit from poverty	Entry into poverty	Chronic Poor	Total
Coastal Lowlands	Count	12	13	27	27	79
	Percentage	15.2	16.5	34.2	34.2	100.0
Eastern Lowlands	Count	57	30	25	44	156
	Percentage	36.5	19.2	16	28.2	100.0
Western Lowlands	Count	16	18	21	120	175
	Percentage	9.1	10.3	12.0	68.6	100.0
Western Transitional	Count	37	58	11	59	165
	Percentage	22.4	35.2	6.7	35.8	100.0
High Potential Maize	Count	151	59	35	140	385

Zone						
	Percentage	39.2	15.3	9.1	36.4	100.0
Western Highlands	Count	15	33	10	81	139
	Percentage	10.8	23.7	7.2	58.3	100.0
Central Highlands	Count	166	42	19	31	258
	Percentage	64.3	16.3	7.4	12.0	100.0
Marginal Rain Shadow	Count	11	14	7	16	48
	Percentage	22.9	29.2	14.6	33.3	100.0
Total	Count	465	267	155	518	1405
	Percentage	33.1	19.0	11.0	36.9	100.0

A comparative analysis of the poverty entry and exit columns shows that the majority of the agro-ecological zones registered more entries into poverty than exits from poverty. This may explain why the incidence of poverty increased between 1997 and 2000.

Western Transitional Zone has the largest proportion of households (35%) exiting poverty. 58 households in this zone climbed over the poverty line between 1997 and 2000, while only 11 households in this zone descended into poverty in 2000 after having been above the poverty line in 1997. The Western Highlands Zone also registered a decline in transitory poverty, 23.7% exited poverty while only 7.2% entered into poverty. But several zones recorded an alarming increase in poverty between 1997 and 2000, in particular Coastal Lowlands, Eastern Lowlands, Western Lowlands, and the High-Potential Maize Zone. Among the districts, Kakamega, Nyeri, Bungoma and Kisii have the largest proportion exiting poverty while Nakuru, Uasin Gishu, Kisumu and Makueni have the largest proportions entering poverty.

7.1 Changes in Poverty and Cultivated Area.

The area under cultivation by the different poverty categories generally increased in 2006.

Table 18: Mean Area Cultivated by Change in Poverty

	Mean Cultivated Area	
Poverty Categories	1997	2006
Non-Poor	7.43	5.89
Exits	5.07	3.85
Entries	5.65	5.19

Chronic Poor	3.67	2.91

It would appear that exiting poverty is not directly related to the acreage under cultivation. The computations above indicates that those exiting poverty had a lower mean cultivated area a fact that seems to point towards productivity changes.

7.2 Crop Land Productivity by Changes in Poverty

Poverty dynamics is closely related to crop land productivity as indicated in Table 19.

Table 19: Crop Land Productivity by Poverty Dynamics

Mean Crop Productivity (Nominal)		
Poverty Categories	1997	2000
Non-Poor	105,422.50	142,941.80
Exits	29,255.53	104,225.30
Entries	69,687.28	37,637.90
Chronic Poor	20,314.79	29,525.78

The transitory poor who exited poverty attained a much higher crop land productivity against their counterparts who entered poverty in 2006.

The converse is also true in that those who exited poverty had a lower crop land productivity in relation to those who entered poverty in 1997.

The foregoing observation implies that productivity is a major determinant in exiting or entering poverty or remaining chronically poor.

8.0 DETERMINANTS OF RURAL CHRONIC POVERTY

To establish the factors that influence rural chronic poverty, a Probit model is used for analysis. In this case the dependent variable takes on a value of one if Chronic poor and zero otherwise.

9.0 Probit Model Estimation Results

The estimation results as indicated in table 20 indicate that initial assets, the number of female and male household members aged between 17 and 39, the number of household members aged over 40, the total acreage cultivated, the distance to a tarmac road and the highest education of male household members are negatively related to chronic poverty. These variables therefore reduce the probability of

being chronic poor in the rural households. The change over from a female household head to a male household head also appear to reduce the chances of chronic poverty.

In terms of resource endowments, initial assets, total acreage cultivated and highest level of education of male household members are found to significantly influence a household's poverty category by reducing the probability of chronic poverty. These factors should provide avenues for intervention through anti-poverty programmes.

Changes in these same variables also significantly influence Chronic Poverty.

Table 20: Probit Model Estimation Results

Probit Estimates					Number of obs =		1338.00000
					LR chi2(43) =		483.73000
					Prob > chi2 =		0.00000
Log Likelihood = -676.452					Pseudo R2 =		0.26340
Pov	**|**	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
agehh97	|	0.42686	0.47163	0.91000	0.36500	-0.49752	1.35124
ageh97sq	|	-0.10034	0.14630	-0.69000	0.49300	-0.38709	0.18641
femhhd97	|	0.19280	0.12658	1.52000	0.12800	-0.05529	0.44089
asset97	|	-0.00001	0.00000	-7.04000	0.00000	-0.00001	-0.00001
F1739_97	|	-0.54836	0.24987	-2.19000	0.02800	-1.03809	-0.05862
m1739_97	|	-0.04170	0.12167	-0.34000	0.73200	-0.28017	0.19677
ov40_97	|	-0.34923	0.22223	-1.57000	0.11600	-0.78478	0.08633
un16_97	|	0.04823	0.11666	0.41000	0.67900	-0.18042	0.27688
feduc97	|	0.07597	0.07094	1.07000	0.28400	-0.06308	0.21502
meduc97	|	-0.07747	0.04388	-1.77000	0.07700	-0.16348	0.00853
tacr97	|	-0.08768	0.01727	-5.08000	0.00000	-0.12154	-0.05383
Deathml	|	0.25500	0.32655	0.78000	0.43500	-0.38503	0.89503
Deathfl	|	0.25038	0.42181	0.59000	0.55300	-0.57636	1.07711
Dtmroad	|	-0.00874	0.00686	-1.27000	0.20300	-0.02219	0.00472
Kilifi	|	-0.03156	0.27840	-0.11000	0.91000	-0.57722	0.51410
Kwale	|	-1.03206	0.43241	-2.39000	0.01700	-1.87957	-0.18455

Taita	0.61239	0.56575	1.08000	0.27900	-0.49646	1.72123
Kitui	2.09886	0.51706	4.06000	0.00000	1.08543	3.11228
Mach	1.06442	0.36591	2.91000	0.00400	0.34724	1.78159
Mak	-0.34878	0.27028	-1.29000	0.19700	-0.87852	0.18097
Meru	-1.86400	0.37458	-4.98000	0.00000	-2.59817	-1.12983
Mwing	0.99015	0.33461	2.96000	0.00300	0.33432	1.64598
Kisii	0.51682	0.25930	1.99000	0.04600	0.00860	1.02504
Kisum	0.45327	0.25411	1.78000	0.07400	-0.04477	0.95131
Siaya	0.61336	0.26201	2.34000	0.01900	0.09984	1.12688
Bungoma	-0.06349	0.25058	-0.25000	0.80000	-0.55462	0.42763
Kkmega	0.13518	0.22829	0.59000	0.55400	-0.31227	0.58262
Vihiga	0.18830	0.27754	0.68000	0.49700	-0.35566	0.73227
Muranga	-0.32138	0.25866	-1.24000	0.21400	-0.82834	0.18558
Nyeri	-0.96906	0.25848	-3.75000	0.00000	-1.47568	-0.46244
Bomet	-0.03292	0.30685	-0.11000	0.91500	-0.63432	0.56849
Nakuru	0.19100	0.24756	0.77000	0.44000	-0.29421	0.67621
Narok	1.20922	0.44936	2.69000	0.00700	0.32850	2.08995
Tnzoia	-0.02366	0.27108	-0.09000	0.93000	-0.55497	0.50765
Ugishu	0.01672	0.25034	0.07000	0.94700	-0.47394	0.50737
ast0097	0.00000	0.00000	-3.29000	0.00100	0.00000	0.00000
f1739097	0.12871	0.04860	2.65000	0.00800	0.03346	0.22397
m1739097	0.07932	0.04621	1.72000	0.08600	-0.01125	0.16990
ov400097	-0.09980	0.08905	-1.12000	0.26200	-0.27434	0.07473
un160097	-0.05199	0.05049	-1.03000	0.30300	-0.15095	0.04696
tacr0097	-0.03493	0.00971	-3.60000	0.00000	-0.05396	-0.01590
fem_2_ml	-0.22612	0.15328	-1.48000	0.14000	-0.52654	0.07429
ml_2_fem	0.10107	0.26758	0.38000	0.70600	-0.42337	0.62551
_cons	0.21597	0.42250	0.51000	0.60900	-0.61212	1.04406

Note: 12 failures and 0 success completely determined

10.0 CONCLUSIONS AND IMPLICATIONS FOR POLICY

The study offers the following lessons from a Policy perspective:

Poverty reduction cannot be attained in the absence of a strong and sustained pro-poor economic growth. The country's poor and non-poor are closely associated with agriculture and the greatest gains on poverty reduction can be achieved through stimulating an efficient agricultural sector. This is further reinforced by the observation that the periods of highest economic growth in Kenya coincided with the periods when agriculture was most vibrant.

The country has a large population under chronic poverty as opposed to other regions of the world. This observation in itself implies that for anti-poverty programmes to achieve the intended, they have to be designed and implemented in a manner that takes into account the large presence of the chronic poor. Anti-poverty programmes that favour the chronic poor require programmes that address mean income growth as opposed to transitory poverty that requires programmes that smooth mean incomes over time. Generic anti-poverty programmes are likely to benefit the transitory poor more than the chronic poor. However, a blend of anti-poverty programmes that provide for both chronic and transitory poverty is imperative.

1. The poor are generally distributed all over the country to the extent that even areas thought to be exclusively non-poor still show elements of chronic poverty. It would therefore be prudent to recognize that poverty in Kenya is an intra-village phenomenon rather than an inter-village issue. This implies that poverty traps take on a rather different dimension from the conventional which seem to associate poverty to spatial location.
2. The design and implementation of anti-poverty programmes' Monitoring and Evaluation tools can substantially benefit from the categorization and characterization of poverty levels and the corresponding analytical tools. The process of examining poverty dynamics can enrich the PRSP's M&E initiative in the short term and the Poverty Eradication Plan in the Long term especially through the development of sustained and consistent data bases that can elicit the desired information. This also calls for the strengthening of Poverty dynamics analytical capacity in the various Government organs vested with the responsibility of monitoring poverty levels and evaluating anti-poverty programmes.
3. Effective anti-poverty programmes have to account for the following which have significant effects on chronic poverty and transitory (exit or entry) into poverty:

    i) Anti-poverty measures directed towards improving Agricultural productivity are likely to reduce chronic poverty and influence movement out of poverty
    ii) Education, in as far as it influences agricultural productivity plays a significant role in poverty reduction. It should, however be noted that there exists a turning point in the effect of education on agricultural productivity and consequently poverty reduction. It appears that completion of secondary school education has the closest association with maximum poverty reduction and exit from poverty.

iii) The agricultural credit system requires restructuring to be accessible to the poor. Credit has also been shown to be closely associated with high agricultural productivity and movement out of poverty.

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