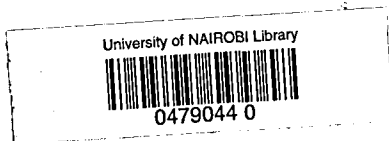


**Poverty and Inequality in Kenya, 1994 -1997: A  
Stochastic Dominance Approach. 9**

**By**

**Njuguna, Francis Mburu**

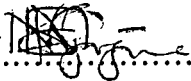
**C50/7196/2003.**



**A research paper submitted to the Economics Department, University of Nairobi, pursuant to the requirements of the Degree of Masters of Arts in Economics in 2005.**

## Declaration

This is my original work and has never been presented for any degree award in any other university.

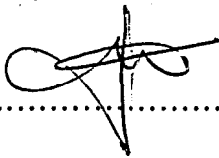
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Date 31<sup>st</sup> August 2005 .....

## Approval

This research paper has been submitted with our approval as university supervisors.

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Date 31<sup>st</sup> August 2005 .....

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Despite all this able assistance, I accept full responsibility for any flaws in the writing of this paper. It has been a joy to craft it and I hope it will help to advance the field of poverty, inequality and policy intersect.

## **Dedication**

This paper is dedicated to my parents Wanjiru and Njuguna for their unrewardable and priceless gift of encouragement and support, and to my sister Njeri for her tireless efforts in ensuring I accessed higher education.

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## Definition of Terms

**Stochastic** is synonymous with "random" and means "Pertaining to chance". It is used to indicate that a particular subject is seen from point of view of randomness.

A **stochastic process** is an indexed collection of random variables, each of which is defined on the same probability space and takes values on the same codomain (often the reals).

**Distribution** - This is a list of socio-economic attributes characterizing the various individuals in a society.

**Stochastic dominance** - This refers to comparison relationship between two stochastic distributions. In this study, it refers to the sensitivity of the ranking of poverty levels between groups or between periods to the use of different poverty lines.

**Poverty dominance** - Two poverty indices may rank two distributions A,  $(y^A_1, y^A_2, \dots, y^A_N)$ , and B,  $(y^B_1, y^B_2, \dots, y^B_N)$ , differently. Distribution A poverty dominates distribution B, in the sense of  $\Phi$ , if there is less poverty with A than with B for all indices  $P_p()$  where  $p()$  belongs to the family of poverty intensity functions  $\Phi$ .

**Welfare** - The state or condition of doing well, good fortune, happiness, or well-being.

In calculus, a differentiable function  $f$  is **convex** on an interval if its derivative function  $f'$  is increasing on that interval. Similarly, a differentiable function  $f$  is **concave** on an interval if its derivative function  $f'$  is decreasing on that interval.

## **List of Abbreviations**

GoK - Government of Kenya.

PPARs - Participatory Poverty Assessment Reports.

NPEPs - National Poverty Eradication Plans.

PRSPs - Poverty Reduction Strategy Papers.

WB - World Bank.

IMF - International Monetary Fund.

FGT - Foster, Greer and Thorbecke.

WMS - Welfare Monitoring Survey.

SAPs - Structural Adjustment Programs.

MDGs - Millennium Development Goals.

CBS - Central Bureau of Statistics.

SSA - Sub Saharan Africa.

CPAE - Consumption Expenditure Per Adult Equivalent.

CDF - Cumulative Distribution Functions.

PIC - Poverty Incidence Curves.

## **EXECUTIVE SUMMARY**

### **Purpose of the Document**

This study compares changes in poverty and inequality in Kenya between regions, over time and their robustness using stochastic dominance analysis and data sets from 1994 and 1997 WMS. This has been enthused by the query of whether it is practical to take on an alternative approach to poverty analysis that does not rely on the subjective exercise of setting a poverty line in the Kenyan context.

Arising from this analysis, focus has placed on providing of an additional set of results by applying robust techniques for comparing income and or expenditure-based distributions in addition to standard measures of poverty and inequality. In this paper, stochastic dominance analysis is applied to a series of regionally representative Kenya household survey data to shed some light on the intertemporal patterns of changes in welfare levels and distribution, across geographical and socio-economic groupings of interest. The study, by capitalizing on the time series of the Kenya National Household Surveys, makes additional contribution to debate on the trend of poverty, inequality and changes in welfare level and distribution in Kenya. The use of stochastic dominance to compare distribution of welfare levels and across groups over time, tests the robustness of changes in poverty and inequality that have been reported by other scholars, determines the extent to which the conclusions differ and the extent to which the findings are sensitive to the choice of poverty lines using the same data set.

The paper is divided into five chapters. Chapter one focuses on the different definitions of poverty and inequality, their measurement, profiles and governments efforts towards alleviation of poverty and inequality. The research questions, problem statement, objectives and significance of the study are also included in this chapter. Chapter two reviews literature on poverty and inequality while chapter three explains stochastic dominance, the methodology behind this study. Results of the study, conclusions and policy implications are included in chapter four and five respectively.

## Methodology

We note that there is and has been a lack of consensus on how to measure poverty, even though poverty indices and poverty profiles are increasingly used as guides in targeting resources to reduce poverty. An allocation that is efficient according to one methodology may yield unacceptable results when a different methodology is applied. It is possible that different measures will rank the same set of distributions in different ways due to their differing sensitivity to expenditures in different parts of the distribution. When rankings are ambiguous, the alternative method of stochastic dominance is applied.

Poverty dominance analysis uses stochastic dominance to provide rankings of distributions in terms of poverty, which are not sensitive to the choice of poverty line. Stochastic dominance, in relation to poverty involves ranking of income / expenditure distributions, i.e. it examines whether one distribution has unambiguously more or less poverty than another over a range of potential poverty lines.

Most of the studies in poverty and inequality in Kenya have used the summary measures to determine their extent and level. The robustness of poverty measures using summary measures (means and variances) can be compromised by errors in living standards data, unknown differences between households at similar consumption levels, uncertainties and arbitrariness in both the poverty line and precise poverty measure.

Application of the theory of stochastic dominance to poverty analysis permits a more robust comparison by ranking distributions, which would not have been possible simply from the comparison of the mean and variance of the variations. It allows poverty comparisons to be made without prior specification of the poverty line.

In order to compare changes in poverty rates for Kenya, this study tests robustness of the observed changes in the poverty using stochastic dominance analysis, which is a robust way of ranking distributions. This approach avoids the problem that poverty comparisons may not be robust to the subjective choice of a poverty line. It also avoids the potential that small movements across the thresholds may have large impacts on poverty indexes. This is then compared with results from other studies to determine the extent to which conclusions differ and the extent to which the findings are sensitive to the choice of poverty lines.

## **Results**

The study finds that first order poverty dominance holds for the years of 1994 and 1997 over what the paper regards a reasonable range of expenditure levels. Thus it is possible to say with a fair degree of confidence that poverty in 1994 was lower than in 1997. We have demonstrated in this paper that, irrespective of the choice of poverty line, there was widespread deterioration in welfare across regional and socioeconomic groupings between 1994 and 1997.

This paper has advanced the analysis of poverty in Kenya in a number of directions. It employs Welfare Monitoring Survey data and permits comparison with previous work on poverty in Kenya using different methodologies. It also applies stochastic dominance techniques; a method whose novelty is its ability to overcome the difficulties associated with analyses which use specific poverty lines. We find that poverty in Kenya in 1994 was lower than in 1997 for a fairly wide range of absolute poverty lines. However, we believe that the dominance results are important since they enable robust statements to be made regarding developments in poverty over the 1994 - 97 periods.

## **Conclusions**

For the government efforts at reducing poverty and inequality to bear fruit, we need robust information on the characteristics of the poor and how these characteristics affect them. Moreover, before justifying the targeting of poverty alleviation policies and projects to a category of people and or region, the necessity of robust evidence is inevitable. Few conclusions can be drawn if poverty trends differ substantially when different poverty measures are applied or the position of the poverty line is changed. Poverty dominance analysis uses stochastic dominance to provide rankings of distributions in terms of poverty, which are not sensitive to the choice of poverty line. Thus, what is ideally needed is an approach which is robust to the choice of poverty line. Application of the theory of stochastic dominance alleviates this problem.

## **Abstract**

This study has been motivated by the question of whether it is practical to adopt an alternative approach to poverty analysis that does not rely on the subjective exercise of setting a poverty line in the Kenyan context.

This paper focuses on poverty dominance analysis, which uses stochastic dominance to provide rankings of distributions in terms of poverty which are not sensitive to the choice of poverty line. This analysis is carried for Kenya using Welfare Monitoring Survey data for 1994 and 1997 to shed some light on the intertemporal patterns of changes in welfare levels and distribution in Kenya across geographical and socio-economic groupings of policy interest. We find that for a wide range of poverty lines, poverty and inequality increased in Kenya over the period. At the regional levels, Central region enjoys a higher standard of living than other regions while North eastern region is worst hit by poverty.

## CHAPTER ONE: INTRODUCTION

Poverty has been a major concern of governments world over and many poverty reduction programmes have been developed over time and across regions. Despite these efforts, poverty and inequality continue to be key impediments to both human and economic prosperity (Organization for Economic Corporation and Development, 2000). As put in the various policy documents, the Government of Kenya (GoK) has since independence in 1963 directed its efforts to fighting disease, ignorance and poverty as part of its development objectives. The policies notwithstanding, poverty and inequality levels continue to amplify.

The Kenyan government has since then put in place various policies and resources to alleviate poverty and inequality. In its Sessional Paper No. 10 of 1965 on *African Socialism and its Application to Planning in Kenya*, the government recognized poverty, disease and illiteracy as the major constraints to human development. Consequent to this, various development plans, Participatory Poverty Assessment Reports (PPARs, 1999), National Poverty Eradication Plans (NPEP, 1999) and Poverty Reduction Strategy Papers (PRSP, 2001-2004) have spelt out the strategies to fight poverty.

Even though poverty has been pronounced since independence when the economy began to tumble, it is only in the 1980s that the government took drastic measures to assess the poverty levels in the country. This is due to a change in focus by the development partners such as the World Bank (WB) and the International Monetary Fund (IMF) and also due to the increasing poverty levels among rural and urban population.

The government has also established the causes, constraints and the processes that engender and entrench poverty but despite these positive developments, poverty alleviation has remained elusive particularly from the 1980s. Poor economic performance has led to increases in absolute poverty, i.e. people without adequate food and nutrition, and inadequate access to basic services, education, health facilities, safe water and decent housing. This has been blamed on poor policy formulation, initiation, planning and implementation of poverty alleviation programmes and overall poor economic performance. The PPARs have broadened perceptions of the poor on the phenomenon of poverty. The reports reveal that the poor have been excluded in formulating policies aimed at alleviating poverty. The poor have over the years been reduced to passive

participants in their own development, reducing their ownership of poverty alleviation programmes. They are not involved in formulating the policies and identifying the specific projects that will raise the level of development.

With the release of the National Poverty Eradication Programme (NPEP, 1999 - 2015), the government committed itself to poverty alleviation by 2015. Doubtless, this endeavor needs to be supported by focused policies directed at raising the level of productivity of the economically weak through close cooperation of the institutions implementing the programmes. However, before justifying the targeting of poverty alleviation policies and programmes to a category of people or region, there is need for robust evidence to support this.

## **1.1 Poverty Definitions and Measures**

### **1.1.1 Definitions of Poverty**

World Bank (2005)<sup>1</sup> categorizes the various definitions of poverty as follows:

**Income-based definitions:** This approach seeks to specify a level of income per capita in a household below which the basic needs of the family cannot be met. It does not acknowledge variation in costs of similar goods for different consumers. The vital importance of non-market household production and non-monetarized exchanges in poor families is not counted.

**Basic needs approaches:** A set of minimal conditions of life, usually involving the quality of the dwelling place, degree of crowding, nutritional adequacy and water supply are specified and the proportion of the population lacking these conditions is used to estimate the degree of poverty. The advantage of this approach is that different conditions appropriate to different settings can be specified. However, this reduces comparability of estimates in different sites. Similarly, it does not take into account the willingness of people to accept various tradeoffs deliberately (for instance, a lower quality dwelling for reduced transportation time and expense to work).

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<sup>1</sup> See [www.worldbank.org/poverty/inequality/index.htm](http://www.worldbank.org/poverty/inequality/index.htm)

**Participatory definitions:** In this approach, respondents from communities are themselves invited to identify perceptions on their needs, priorities and requirements for minimal secure livelihood. Some sacrifice of comparability of estimates in different communities or at different times is traded off for better information on the identified demands of the individuals themselves. At times, such analyses supplement and reinforce the quantitative measures and at other times, they reveal a very different experienced reality.

Poverty may also be defined in absolute or relative terms (GoK, 1998). Absolute poverty is a state where one cannot raise the income required to meet expenditure for purchasing a specified bundle of basic needs. Relative poverty is when one cannot purchase a bundle of basic needs available to a reference group, such as people within a median income level.

Despite the many facets of defining poverty, World Bank (2000) admits that we have misconceptions about the poor, why they are poor and what is needed to help them out of this vicious cycle. Regardless of the many definitions of poverty and its multidimensional perspective, we can conclude that overall poverty takes many forms; including lack of income and productive resources to ensure sustainable livelihood, hunger and malnutrition, ill health, limited access to education and other basic services, increased morbidity and mortality rates, homelessness and inadequate housing, unsafe environments, social discrimination and exclusion. It is also characterized by lack of participation in decision making in civil, political, social and cultural life.

### **1.1.2 Poverty Measures**

A poverty measure is an index that shows the magnitude of poverty in a society. To form such a measure, an aggregation formula is required that sums up the income dimensions of poverty for a given population (GoK, 1997; Mwabu et al, 2000). One poverty measure that has been found manageable in presenting information on the poor in an operationally convenient manner is the FGT (Foster, Greer and Thorbecke) measure developed by Foster et al. (1984). This measure is used to quantify the three well-known elements of poverty: the level, depth and severity (also known, respectively, as incidence, inequality

and intensity) of poverty (Jenkins and Lambert, 1997). The FGT formula that is normally used to measure overall income poverty is shown in equation (1).

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^q \left( 1 - \frac{y_i}{z} \right)^{\alpha} \dots\dots\dots (1)$$

Where:

- $P_{\alpha}$  is a measure of absolute poverty, including food poverty,
- $y_i$  is the total expenditure of household  $i$ , expressed in per adult equivalent ( $i = 1, \dots, N$ ),
- $z$  is the poverty line, expressed in per adult equivalent,
- $N$  is the total number of households,
- $q$  is the total number of poor households, and
- $\alpha$  is the FGT parameter, which may be interpreted as a measure of poverty aversion,  $\alpha \geq 0$ .

**1.1.3 FGT Measures**

**Headcount ratio ( $P_{\alpha} = 0$  in equation (1))**

The headcount ratio is the most popular of the FGT measures.<sup>2</sup> It is the ratio of the number of poor individuals to the total population. This ratio has some shortcomings. First, it does not show how far below the poverty line the poor are; that is, it ignores the inequality among the poor. Second, it forces the overall poverty index to remain constant even when the welfare of the poor has improved or worsened. Third, with this index, an income transfer from an extremely poor person to a person just below the poverty line (enabling them to cross the line) would show a reduction in poverty despite the decline in the income of the extremely poor. (Poverty declines here because, for the same population, there are fewer people below the poverty line, but poverty gap widens).

**Poverty gap ( $P_{\alpha} = 1$  in equation (1))**

This measures the shortfall of the average income of the poor relative to the poverty line. It can be used to estimate the resources that would bring the expenditure of every poor person up to the poverty line, thereby eliminating absolute poverty. The main weakness

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<sup>2</sup> Suppose we have  $n$  households with income/expenditure  $x_1, x_2, \dots, x_n$  and the poverty line is  $z$ . Then if  $q$  households have incomes below  $z$ , the headcount ratio is simply  $H = q/n$ .

of the poverty gap is that when it is used to assess welfare, it does not differentiate the degree of inequality among the poor.

### **Poverty severity ( $P_\alpha = 2$ in equation (1))**

This is a measure of the severity of poverty among the poor. Poverty severity is measured by the square of the poverty gap, and it increases more than proportionately with the poverty gap. The poverty severity index as measured by  $P_\alpha = 2$  is larger than the poverty gap, which indicates that poverty is severest among the very poor.

Hypothesis tests on  $P_\alpha$  measures can be used to test differences in poverty between groups.<sup>3</sup> However, the robustness of poverty comparison using summary measures can be compromised by errors in living standards data, unknown differences between household consumption level, uncertainties and arbitrariness about both the poverty line and the precise poverty measure. Application of the theory of stochastic dominance alleviates this problem (Ravallion, 1992).

## **1.2 Inequality Definitions and Measures<sup>4</sup>**

### **Definition**

Inequality refers to the variations in living standards/well-being across a whole population. It is the fundamental disparity that permits one individual certain material choices while denying another those very same choices. Inequality in welfare distribution means different things to different people.

Inequality is often conceptualized as part of a broader analysis covering poverty and welfare, although these three concepts are distinct. Inequality is a broader concept than poverty. It is defined not only over the censored distribution of individual or households below a given poverty line but also over the whole distribution. By contrast, poverty focuses on those whose living standard falls below a certain threshold (poverty line). Intuitively relative poverty is closely related to inequality in that what it means to be poor reflects living conditions in the population, but degree of inequality will have implication on both concepts of poverty (relative and absolute). However, inequality is a much narrower concept than welfare. Welfare captures all aspects of social-economic well

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<sup>3</sup> See Kakwani, (1993)

<sup>4</sup> See [www.worldbank.org/poverty/inequality/index.htm](http://www.worldbank.org/poverty/inequality/index.htm)

being. Although both inequality and welfare capture the whole distribution of a given indicator, inequality is independent of the mean of the distribution (Ferreira, et al 1999).

### 1.2.1 Types of Inequality

- **Income inequality.** This refers to the gap between the rich and the poor and or people with similar background, status, qualifications but with different incomes. It is caused by differences in education, qualification, skills, abilities, experiences and regressive tax system.
- **Gender inequality.** Manifested in wages, discrimination, domination on positions of power and responsibility. This limits extent to which women/men can make to the top, often called glass ceiling.
- **Opportunity inequality.** It is caused by ease of access to education, work, housing, markets on basis of race, ethnicity and gender, even across countries.
- **Asset/wealth inequality.** Results due to disparity not just in quantity but quality of natural resources, infrastructure, raw materials, amount of human and capital assets.

In this paper, we conceptualize inequality as dispersion of a distribution, for example, of income, consumption, or some other welfare indicator or attribute of a population.

### 1.2.2 The Axiomatic Approach to Inequality Measurement<sup>5</sup>

In this section, we discuss the axiomatic approach and outline five key axioms, which inequality measures are usually required to meet.

#### (i) The Pigou- Dalton Transfer Principle (Dalton, 1920; Pigou, 1912)

This axiom requires an inequality measure to rise (or at least not fall) in response to a mean-preserving welfare spread. That is, an income transfer from a richer to a poorer person should have a non-increasing impact on inequality while an income transfer from a poorer to a richer person should have a non-decreasing impact on inequality (Atkinson, 1970 and 1983; Cowell, 1985 and Sen, 1976).

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<sup>5</sup> See [www.personal.rhul.ac.uk/ulte/108/EC1111/14](http://www.personal.rhul.ac.uk/ulte/108/EC1111/14).

**(ii) Anonymity**

This axiom requires that the inequality measure be independent of any characteristic of individuals other than their income (or the welfare indicator whose distribution is being measured).

**(iii) Principle of population (Dalton, 1920)**

This principle requires inequality measures to be invariant to replications of the population. That is, merging two identical distributions should not alter inequality.

**(iv) Income scale independence**

Inequality measures are required to be invariant to uniform proportional changes: that is, if each individual's income changes by the same proportion (as it happens, say, when changing currency unit) then inequality should not change.<sup>6</sup>

**(v) Decomposability**

This requires overall inequality to be related consistently to constituent parts of the distribution, such as population sub-groups. For example, if inequality rises within each sub-group of the population, then it is expected that overall inequality should increase.

**1.2.3 Inequality Measures**

Given these axioms, several measures of inequality have been generated. Most of the members of the **Generalized Entropy (GE)** class of measures have the general formulation:

$$GE(\alpha) = \frac{1}{\alpha^2} - \alpha \left[ \frac{1}{n} \sum_{i=1}^n (y_i / \bar{y})^2 - 1 \right] \dots\dots\dots (2)$$

Where  $n$  is the number of individuals in the sample,  $y_i$  is the income of individual  $i$ ,  $i = 1, 2, \dots, n$ , and  $\bar{y} = \frac{1}{n} \sum_{i=1}^n y_i$  is the arithmetic mean income. GE has a value ranging from 0 to  $\infty$ , with zero representing an equal distribution (identical incomes) and higher values representing higher levels of inequality. The parameter  $\alpha$  in the GE class represents the weight given to distances between incomes at different parts of the income distribution, and can take any real value. For lower values of  $\alpha$ , GE is more sensitive to changes that

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<sup>6</sup> See Cowell, 1995.

affect the upper tail. The commonest value of  $\alpha$  used are 0, 1 and 2: hence a value of  $\alpha = 1$  applies equal weights across the distribution, while a value of  $\alpha = 2$  gives proportionately more weight to gaps in the upper tail. The GE measures with parameters 0 and 1 become two of Theil's (1967) measures of inequality, the *mean log deviation* and the *Theil index* respectively, given by:

$$GE(0) = \left[ \frac{1}{n} \sum_{i=1}^n \log \bar{y} / y_i \right] \dots\dots\dots (3), \text{ and}$$

$$GE(1) = \left[ \frac{1}{n} \sum_{i=1}^n y_i / \bar{y} \log(y_i / \bar{y}) \right] \dots\dots\dots (4).$$

With  $\alpha = 2$  in equation (2), the GE measure becomes  $\frac{1}{2}$  the squared *Coefficient of Variation*, denoted by CV and given as;

$$CV = \frac{1}{\bar{y}} \left[ \frac{1}{n} \sum_{i=1}^n (y_i - \bar{y})^2 \right]^{\frac{1}{2}} \dots\dots\dots (5)$$

The other measure that is commonly used to describe inequality and welfare is the **Atkinson coefficient** (See Atkinson, (1970) for derivation). This index is based on a social welfare evaluation of the expenditure/income distribution. Given a social welfare function, the Atkinson index is constructed by computing the equally distributed equivalent income. This is defined as the level of welfare per head, which, if equally distributed, would give the same level of welfare function, with an inequality aversion parameter *epsilon*. The inequality aversion is always greater than zero and it measures the degree to which social welfare trade off mean living standards on the one hand for equality of the distribution on the other. As *epsilon* rises, more weight is attached to transfers at the top. For instance, if *epsilon* = 2, and individual 'i' is twice as well off as 'j', then the marginal social utility of additional X<sup>7</sup> to 'i' is one fourth the total marginal social utility of additional X to 'j'. As *epsilon* tends to infinity, the marginal social utility of the poorest dominates over all the other marginal utilities, and policy is usually concerned with only the poorest.

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<sup>7</sup> X refers to additional units of a commodity.

The Atkinson class of measures has the general formula:

$$A_{\varepsilon}=1-\left[\frac{1}{n}\sum_{i=1}^n\left(y_i-\bar{y}\right)^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}}\dots\dots\dots (6)$$

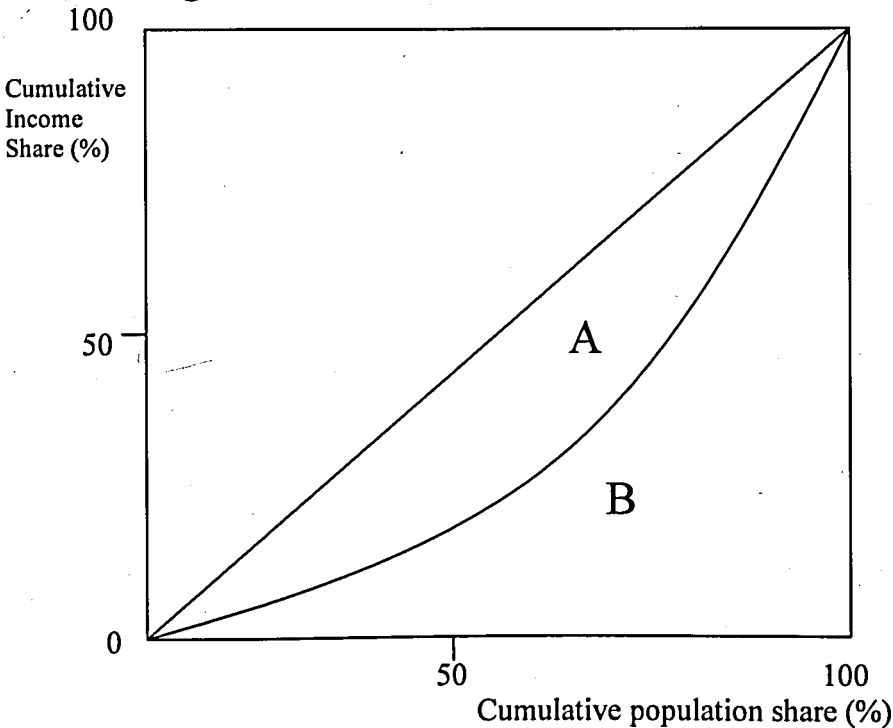
Where  $\varepsilon$  is an inequality aversion parameter,  $0<\varepsilon<\infty$ : the higher the value of  $\varepsilon$  the more society is concerned about inequality (Atkinson, 1970). The Atkinson class of measures range from 0 to 1, with zero representing no inequality. Setting  $\alpha = 1- \varepsilon$  the GE class becomes ordinally equivalent to the Atkinson class, for values of  $\alpha < 1$  (Cowell, 1995).

The **Gini coefficient** satisfies axioms 1 to 4 above, but fails the decomposability axiom if the sub-vectors overlap. The Gini coefficient is defined as follows:

$$Gini=\frac{1}{2n^2}\sum_{i=1}^n\sum_{j=1}^n\left|y_i-y_j\right|\dots\dots\dots (7)$$

The Gini coefficient takes on values between 0 and 1 with zero interpreted as no equality. Graphically, the area between the Lorenz curve and the line of equality can easily represent the Gini coefficient (Kuznets, 1955). This is illustrated in Figure 1.

**Figure 1. Lorenz Curve of Income Distribution**



Source : Fields, 2000.

In figure 1, the Lorenz curve maps the cumulative income share on the vertical axis against the distribution of the population on the horizontal axis. If each individual had the same income, or total equality, the income distribution curve would be the straight line in the graph – the line of total equality. The Gini coefficient is calculated as the area A divided by the sum of areas A and B. If income is distributed completely equally, then the Lorenz curve and the line of total equality are merged and the Gini coefficient is zero. A disadvantage of the Gini coefficient is that it is not additive across groups, i.e. the total Gini of a society is not equal to the sum of the Ginis for its sub-groups.<sup>8</sup>

It is possible that different measures will rank the same set of distributions in different ways due to their differing sensitivity to incomes in different parts of the distribution. When rankings are ambiguous, the alternative method of stochastic dominance is applied.

### **1.3 Poverty Profiles in Kenya**

Poverty in Kenya has been on the increase over time and food poverty has increased more than absolute poverty. For instance in 1972, the number of Kenyans defined as poor was 3.7 million, increasing to 11.5 million in 1994 and further to 13.3 million in 1997. According to the Welfare Monitoring Survey (WMS) of 1994, the incidence of poverty in Kenya was 47 percent in the rural areas and 29 percent in the urban areas. The absolute poverty line was Kshs. 980 per capita per month for rural areas and Kshs. 1,490 per capita for the urban areas. This has since increased to Kshs. 1,239 and 2,648 for the urban and rural areas respectively. Mwabu, et al (2002), found that the number of poor Kenyans had shot up to 15 million (about 56 percent of the total population) in the year 2000.

Poverty is spatial, but unevenly distributed in the country across provinces, urban-rural divide as well as by gender. According to the 1997 WMS, the incidences of rural food poverty stood at 51 percent compared to 38 percent for the urban areas. Overall poverty incidence was 53 percent and 49 percent for the rural and urban areas, respectively. Generally, poverty has hit rural communities more than the urban. Even within the urban areas, there are differences in poverty incidences. The slum sections are more vulnerable than other urban areas.

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<sup>8</sup> See [www.worldbank.org/poverty/inequality/index.htm](http://www.worldbank.org/poverty/inequality/index.htm)

There exist differences in poverty incidences across provinces. Studies by Central Bureau of Statistics (CBS) indicate that the very poor provinces are North Eastern, Coast, and Eastern; the poor are Nyanza, Western and Rift Valley. The poorest districts (with incidences of more than 60 percent) are Marsabit: 88 percent, Samburu: 84 percent, Makueni: 76 percent, Turkana: 74 percent, Machakos: 69 percent, Mandera: 69 percent, Kilifi: 67 percent and Embu: 63 percent (Ayako and Musambayi 1997, GoK 1994 and 1999, United Nations Development Programme 2000 and World Bank 1997). Over a five-year period, poverty has been falling in some provinces such as Central while increasing in others, notably; Nyanza and Coast. There are differences across occupations. The most affected groups are the pastoralists who account for 50 percent of the poor while farmers comprise 46 percent. Among this group, the subsistence farmers are the most affected (46 percent of the very poor).

Table 1 presents the absolute numbers of poor people by region or town as estimated from the Welfare Monitoring Survey of 1997.

**Table 1. Poverty in Kenya for Some Selected Regions, Towns and Cities.**

| Region / Town     | Households below poverty line | Individuals below poverty line |
|-------------------|-------------------------------|--------------------------------|
| Central rural     | 216,047                       | 1,126,826                      |
| Coast rural       | 138,691                       | 883,667                        |
| Eastern rural     | 382,037                       | 2,280,334                      |
| Nyanza rural      | 507,720                       | 2,678,518                      |
| Rift valley rural | 485,182                       | 2,691,909                      |
| Western rural     | 315,074                       | 1,739,131                      |
| Nairobi           | 238,328                       | 959,973                        |
| Mombasa           | 53,438                        | 217,402                        |
| Kisumu            | 31,832                        | 140,407                        |
| Nakuru            | 26,378                        | 113,674                        |
| Other towns       | 142,469                       | 562,446                        |
| <b>Total</b>      | <b>2,537,197</b>              | <b>13,394,287</b>              |

Source: GoK, Second Report on Poverty (June, 2000a).

## **1.4 Government's Efforts to Eradicating Poverty and Inequality**

Even though the necessity to alleviate poverty was identified prior to independence, the numerous policies designed since then have lacked specificity and are deficient of cogent and realistic poverty alleviation strategies. The few, such as rural and informal sector development are hardly given enough political will and resource allocation to spur their growth. Previous poverty alleviation policies reveal that there has been an implicit assumption that the benefits of rapid growth of the key sectors such as industry, service and agriculture will automatically trickle down to all people. As a result, more effort has been spent on ways of improving their economic performance at the expense of promoting social based projects (Omiti, et al. 2002).

Policies pursued since independence can be classified into four phases: The first phase originated before independence with the key feature being the *Swynnerton Plan, 1952/54*. The second phase saw the release of the *KANU Manifesto, 1963* and the *Sessional Paper No. 10 of 1965 on African Socialism and its Application to Planning in Kenya*. The District Focus for Rural Development of 1983 and Sessional Paper No.1 of 1986 on Economic Management for Renewed Growth marked the third phase. The fourth phase consisted of policies, which were fronted by the World Bank and International Monetary Fund (IMF). Such policies included Structural Adjustment Programs (SAPs) that were intended to stimulate economic recovery within the first 18 months of their implementation. However, they worsened the poverty situation in Kenya due to lack of human face in their implementation.

### **1.4.1 The National Poverty Eradication Plan**

The National Poverty Eradication Plan (GoK, 1999-2015) provides a national policy and institutional framework for action against poverty. The vision is to halt the current increase in the incidence of poverty through implementation of well-planned poverty alleviation programmes. The plan intends to bridge the gap between national development plans and address the needs of the poor, come up with a charter for social integration by setting out pro-poor policies and planning, improve access to essential services by low-income households that currently lack basic health, education and safe drinking water. Moreover, develop a strategy for broad based economic growth, increase access to education for children of low-income groups, eliminate shortfalls in the poor

household's access to mother and child health care services and enhance the assets and income streams of the poor to build and maintain group corporations.

#### **1.4.2 Poverty Reduction Strategy Paper**

The Poverty Reduction Strategy Paper (PRSP: GoK, 2001-2004) outlines the priorities and measures necessary for poverty reduction and economic growth. This document recognizes that the primary development goal for Kenya is to achieve a broad based sustainable improvement in the standard of welfare for all Kenyans, and that the role of the government should be to spearhead action and create a positive framework for poverty reduction measures.

Other key features of the paper include recognition of other non-state actors as key stakeholders in poverty reduction efforts; a re-statement that economic growth that outpaces population growth is a prerequisite for poverty reduction and that economic growth on its own cannot ensure poverty reduction and, identification of a number of targeted short term measures to directly address some critical causes and manifestations of poverty.

The paper outlines four basic components and policy objectives in the fight against poverty, to facilitate a sustained, rapid economic growth; improve governance and security; increase the ability of the poor to raise their incomes; and improve the quality of life of all citizens, especially the poor.

So far, PRSP is the most comprehensive and focused policy document in the fight against poverty since independence. This is because it draws from the failures of the past policies and the consultative process that marked its preparation, and the involvement of stakeholders, government, the donors, civil society, the private sector and the citizens.

#### **1.4.3 The Millennium Development Goals (MDGs)<sup>9</sup>**

The MDGs are eight, with 18 targets and 40 indicators that the 191 United Nations Development Programme (UNDP, 2000) member states have agreed to achieve by the year 2015. The UN millennium declaration signed in September 2000 commits the states to reduce by half the proportion of people living on less than one dollar a day and those who suffer from hunger. In general, the MDGs are intended to promote human

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<sup>9</sup> see <http://www.un.org/millenniumgoals/>

development in order to improve living conditions and address key global imbalances in poverty, hunger and disease.

The MDGs in summary, seek to achieve the following.

- Reduce extreme poverty and hunger,
- Achieve universal primary education by 2015,
- Promote gender equality and empower women,
- Reduce child mortality,
- Reduce maternal mortality rate,
- Combat HIV/AIDS, malaria and other diseases,
- Ensure environmental sustainability and
- Develop a global partnership for development.

The MDGs, PRSPs and NPEP represent basic components of decent life. The outcome of the process and the eventual realization of the goals will largely depend on how individual countries identify the critical challenges and transform these into real opportunities for the poor. For the government efforts at reducing poverty and inequality to bear fruit, we need robust information on the characteristics of the poor and how these characteristics affect them. Moreover, before justifying the targeting of poverty alleviation policies and projects to a category of people and or region, the necessity of robust evidence is inevitable. This study compares changes in poverty and inequality in Kenya between regions, over time and their robustness using stochastic dominance analysis.

## 1.5 Research Questions

This study answers the following research questions:

1. Are the results from poverty studies sensitive to choice of poverty line especially when the choice is at the discretion of the analyst? How does this affect their robustness?
2. Does the conclusion differ substantially when summary measures (e.g. mean, variance) and stochastic dominance analysis methods are employed?
3. Do we have an improvement in the levels of poverty, inequality and living standards in Kenya since 1994? If yes, are they significant?

## 1.6 Problem Statement

There is a lack of consensus on how to measure poverty, even though poverty indices and poverty profiles are increasingly used as guides in targeting resources to reduce poverty. An allocation that is efficient according to one methodology may yield unacceptable results when a different methodology is applied.

Results from poverty studies are also sensitive to the choice of poverty line (the means of identifying the poor) and poverty measure (the measure obtained when aggregating incomes or expenditures of households below poverty line). Since the choices are typically at the discretion of the analyst, this has given rise to the suggestion that the results obtained are not robust. Potentially different results could be obtained by the choice of a different poverty line/measure. Moreover, few conclusions can be drawn if poverty trends differ substantially when different poverty measures are applied or the position of the poverty line is changed.

Analysts have tried to overcome the problem by employing a number of poverty lines/measures but this only partially overcomes the problem since it may still be possible to obtain different results by the choice of another poverty line. Thus, what is ideally needed is an approach, which is robust to the choice of poverty line.

Poverty dominance analysis uses stochastic dominance to provide rankings of distributions in terms of poverty, which are not sensitive to the choice of poverty line. Stochastic dominance, in relation to poverty involves ranking of income / expenditure

distributions, i.e. it examines whether one distribution has unambiguously more or less poverty than another over a range of potential poverty lines.

Most of the studies in poverty and inequality in Kenya have used the summary measures to determine their extent and level. The robustness of poverty measures using summary measures (means and variances) can be compromised by errors in living standards data, unknown differences between households at similar consumption levels, uncertainties and arbitrariness in both the poverty line and precise poverty measure<sup>10</sup>.

Application of the theory of stochastic dominance to poverty analysis permits a more robust comparison by ranking distributions, which would not have been possible simply from the comparison of the mean and variance of the variations. It allows poverty comparisons to be made without prior specification of the poverty line.

In order to compare changes in poverty rates for Kenya, this study tests robustness of the observed changes in the poverty using stochastic dominance analysis, a robust way of ranking distributions. This approach avoids the problem that poverty comparisons may not be robust to the subjective choice of a poverty line. It also avoids the potential that small movements across the thresholds may have large impacts on poverty indexes. This is then compared with results from other studies to determine the extent to which conclusions differ and the extent to which the findings are sensitive to the choice of poverty lines.

## 1.7 Objectives of the Study

This paper studies poverty and inequality trends in Kenya using a stochastic dominance approach and data sets from 1994 and 1997 WMS. Arising from this analysis, focus has placed on achieving the following:

1. Providing an additional set of results by applying robust techniques for comparing income and or expenditure-based distributions in addition to standard measures of poverty and inequality.
2. Tracing what has been happening to poverty, inequality, living standards and welfare in Kenya since 1994.

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<sup>10</sup> Dominance conditions are more robust than comparisons based on mean and variances of distributions. On the use of dominance conditions in terms of measures of poverty, see Atkinson, (1987); Foster and Shorrocks, (1988b); Ravallion, (1994) and Howes (1994b).

3. Testing for the robustness of poverty comparisons between regions and over time.
4. Determining the extent to which the conclusions differ and the extent to which the findings are sensitive to the choice of poverty lines.

### **1.8 Significance of the Study**

In this paper, stochastic dominance analysis is applied to a series of regionally representative Kenya household survey data to shed some light on the intertemporal patterns of changes in welfare levels and distribution, across geographical and socio-economic groupings of interest. The study, by capitalizing on the time series of Kenya national household survey, makes additional contribution to debate on the trend of poverty, inequality and changes in welfare level and distribution in Kenya. The use of stochastic dominance to compare distribution of welfare levels and across groups over time tests the robustness of changes in poverty and inequality that have been reported by other scholars, using the same data.

The next section reviews theoretical and empirical literature on poverty and inequality.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Theoretical Literature Review**

Jordan (1996) notes that there are two broad traditions of poverty discourse in the West that have taken shape and crystallized over a period of more than two hundred years. The first is the Anglo-Saxon liberal tradition and the second is the continental mercantilist tradition. The Anglo-Saxon liberal tradition focuses on the 'competitive interaction under scarcity' and the nature of collective action that it gives rise to. The continental mercantilist tradition has been preoccupied with harnessing human resources for enrichment of the state. The poor are like sheep and cattle to be farmed for the glory of the rich.

Kerbo (1996) has identified four different types of poverty theory as listed below.

#### **(i) Social Darwinian Theory of Poverty**

This is the first theory that emerged within sociology and it tried to explain poverty in terms of the behaviours and attitudes of the poor themselves. The poor were poor because they did not work hard; they squandered money on gambling, drinking and unnecessary luxuries and they had disorder of family life. They had no ambition, no inner call for work, were fatalistic, and suffered from "an intractable ineducability" as the Brock Committee phrased it (cited in Matza, 1966: pp. 294).

The poor are poor because they have low Intelligence Quotient, low mental capacity and are biologically destined to be poor. The welfare system that underwrites this human substratum of deviance is a sheer wastage of resources and should be dismantled (Kerbo, 1996).

#### **(ii) Culture of Poverty**

This theory was developed by Lewis (1959). The culture of poverty is a specific syndrome that grows up in some situations. It requires an economic setting of cash economy, a high rate of unemployment and under-employment, low wages and people with low skills. In the absence of voluntary or state support and stable family, the low-income population tends to develop the culture of poverty against the dominant ideology of accumulation of the middle class. The poor realize that they have a marginal position

within a highly stratified and individualistic capitalistic society, which does not offer them any prospect for upward mobility.

### **(iii) Situational Theory of Poverty**

The situational theory of poverty holds that the poor behave differently because they do not have the resources and opportunities for adopting the middle class life styles. The situational theory gives importance to the structural conditions that give rise to poverty, but it also tends to focus upon the individual responses to the objective situation of poverty. It differs from the culture of poverty theory in a fundamental sense. It does not assume the pre-existence of a subculture that gives coherence and solidity to the behaviour of the poor (Della and Richard, 1974).

### **(iv) Structural Theory of Poverty**

Structural theories of poverty hold that poverty is caused by the structure of the larger socioeconomic order. It is the macro-structure of society that produces inequality and consequently poverty. The structure of global capitalism, for example, gives rise to inequality and large-scale poverty all over the world (Friedman, 1996).

#### **2.1.1 Causes of Poverty**

At the individual level, poverty is explained by individual circumstances and/or characteristics of poor people. Some examples are; amount of education, skill, experience, intelligence, health, age, work orientation, time horizon, culture of poverty, discrimination, together with race, and sex.<sup>11</sup> There are two types of aggregate poverty theory: case and generic. There is no agreement on which is the correct explanation of poverty.

In the case aggregate theory of poverty, we add up all poverty explained by individual theories. In other words, according to case theories of poverty, individual and aggregate explanations are really the same. According to these theories, aggregate poverty is just the sum of individual poverty.<sup>12</sup>

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<sup>11</sup> See [www.worldbank.org/poverty/inequality/index.htm](http://www.worldbank.org/poverty/inequality/index.htm)

<sup>12</sup> See [www.worldbank.org/poverty/inequality/index.htm](http://www.worldbank.org/poverty/inequality/index.htm)

In the generic theory, poverty is explained by general economy-wide problems, such as inadequate non-poverty employment opportunities, inadequate overall demand (macro problems, macro policy), and low national income in Less Developed Countries.

If generic theories are correct, poverty is caused by one set of forces (economy-wide problems) but distributed according to individual theories.<sup>13</sup>

### **2.1.2 Poverty Indicators**

The World Bank's criteria for poverty of \$370 per person per year firmly establish low levels of income as being a central feature of absolute poverty. Low-income earners have a high marginal propensity to consume. Most of their income is spent on consumption of necessities such as food. Thus, the marginal propensity to save is low. Saving provides funds that can be lent out to firms for investment purposes. The availability of funds for investment is thus limited. Labour productivity measured in terms of output per worker is consequently low, as capital cannot be purchased. Wages are invariably linked to productivity levels and so incomes are low. The cycle is complete.

However, there are often other cycles operating. People on low incomes often have limited access to schooling and health provision. It is either too expensive to have or, particularly with schooling, the opportunity cost in terms of children's labour on the farms is considerable. Poor health and low levels of education will also contribute to low levels of productivity and the resulting low levels of income. Both these cycles will feed into each other and once in the trap it is very difficult to lift one free of absolute poverty. To cure poverty; incomes, levels of investment, labour productivity and provision of education and health must be increased to break these cycles.<sup>14</sup>

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<sup>13</sup> See [www.worldbank.org/poverty/inequality/index.htm](http://www.worldbank.org/poverty/inequality/index.htm)

<sup>14</sup> See [www.worldbank.org/poverty/inequality/index.htm](http://www.worldbank.org/poverty/inequality/index.htm)

## 2.2 Empirical Literature Review

Chen et al (1994) investigated whether poverty was increasing in the developing world and in the process reported results for Sub Saharan Africa (SSA), based on a sample of 14 countries and data from 1985 to 1990. Due to unavailability of comparable data over time for 12 of the countries, the reported Lorenz curves were assumed to remain constant between the two dates. Reported results thus captured the changes in poverty due to economic growth only. In conducting comparisons, the authors used Poverty Incidence Curves (PIC).

The results were reported in terms of PIC's over five poverty lines. The poverty lines were defined as consumption levels of \$21, \$30, \$42, \$50 and \$60 per person per month. As per the results, poverty increased over the five-year period in SSA and the conclusion is robust for all poverty measures if one restricts the poverty line to \$50 per month.

Ravallion and Chen (1997) reported a new set of results using household surveys for 67 developing countries from 1991 to 1994. Their results show that poverty increased for all poverty measures used. The headcount ratio increased from 38.5% in 1987 to 39.1% in 1993 while the poverty gap index increased from 14.4% to 15.3% in the same period. They keep the poverty line constant over time. They rank SSA second to South Asia in terms of incidence of poverty and first in depth of poverty as measured by the poverty gap ratio.

Ali (1998), in a study of Latin America, Asia and SSA, found that when the real poverty line is allowed to vary, the pure growth effect on poverty is less than when the poverty line is presumed constant. Ali further found that for the additively separable class of poverty measures, distribution rather than the growth matters for more poverty reduction. On the existence of a Kuznets hypothesis, the inequality initially worsens during the first stages of development then declines. As to whether the initial inequality affects growth, the empirical results were mixed when regional differences and political regimes were taken into account.

Ali and Thorbecke (2000) provided a detailed analysis on the state and evolution of poverty in Africa using information on income distribution as well as the characteristics of the poor in rural and urban areas. They looked at changes in poverty over time in terms of growth and distribution components. Their paper builds on earlier work by Chen et al

(1994) and Ravallion and Chen (1997), which provides a measure of the level and changes in poverty in developing countries including SSA. The main difference in the two studies is the approach to the measurement of poverty. Ali and Thorbecke use an approach that is largely descriptive and they attempt to build an overall picture of poverty in SSA. They report poverty results in terms of headcount ratio, poverty gap ratio and squared poverty gap ratio by following a relative approach i.e. they choose a poverty line that varies with each country's average income from a cross-sectional context.

Their results show a high degree of deprivation in both rural and urban sectors of the region, with 181 million people in rural areas and 59 million people in urban areas living below the poverty line of a dollar per day. Their paper observes that the increase in poverty across Africa has been greatly underestimated by studies using absolute poverty lines to identify the magnitude of poverty over time in SSA. The effects of better income distribution on poverty reduction have also been understated. Using a relative poverty line the paper reports a larger increase in poverty in Africa between 1980 and 1990's than earlier documented. The authors further found that the impact of less income inequality on poverty dominates that of growth. Large distributional changes can occur within a relatively short period. They suggest a possible association between lack of social amenities and poverty.

In a comment, Shimelis (2000) emphasizes the importance of appropriately determining the poverty line. He reviews relevant conceptual issues and concludes that from a theoretical perspective, the poverty line is not invariant to changes in income hence supporting the concept of relative poverty line. At the empirical level, he supports Ali and Thorbecke's method of determining poverty line. Their findings suggest that different methods of determining the poverty line can yield radically disparate policy conclusions. Oyugi (2000), on the study 'Determinants of Poverty in Kenya' extended the earlier work by Greer and Thorbecke (1986) by using both discrete and continuous indicators of poverty as dependant variables. The authors employed a much larger data set of household characteristics as explanatory variables. The study was carried out at both micro (household) and meso (district) levels and a probit model was employed in the analysis of discrete poverty. The model was estimated using data from the household

rather than the individual. The dependent variable, that is poverty status, was a binary variable derived by Mwabu et al (2000).

Oyugi uses the explanatory variables (household characteristics) including holding area, livestock unit, number of literate household members, size of household, occupation and source of water. The study is based on data from the 1994 Welfare Monitoring Survey. The results indicate that all variables used and noted above were important determinants of poverty in rural areas and at the national level but there exists some exceptions in urban areas.

Mwabu et al (2000) apply the concept of household welfare (proxied by household expenditure per adult equivalent) to understand the determinants of poverty, their measurement and profiles. The authors run two categories of regressions using overall expenditures and food expenditures as dependant variables. They estimate overall expenditure using three equations, which differ as per the dependant variable. The dependant variables used are household expenditure, total household expenditure gap and squared gap. They identified the variables; mean age, household size, residence and level of schooling as important in explaining poverty. This method is highly used in poverty analysis and is informative.

Mwabu et al (2001) carried out a study to explain why a particular population group is poor, non-poor and extremely poor using ordered logit and probit models. Their study indicated that poverty status is highly correlated with the level of education, household size and the type of occupational activity and is most prevalent in rural areas. Poverty falls as the level of education increases and rises with household size and with engagement in agricultural activities. The effects persist in both binomial and polychotomous models of poverty determination. However, they admit that the logit/probit models involve unnecessary loss of information in transforming household expenditures into binary variables.

The papers that have attempted empirical tests on the impact of Structural Adjustment Programmes on poverty in developing countries include Kakwani (1990), Ravallion and Huppi (1991), and Ali (1992). These studies have used the approach developed by Kanbur (1987) who argued that distribution effects on adjustment programmes can best be analyzed by a means of a fully specified model that takes into account all of the

general equilibrium feedbacks of the programme. His methodology requires that measurement of poverty be followed by a test of the effect of expenditure reduction on poverty using additive or multiplicative model.

Kakwani (1990) uses the methodology developed by Kanbur to model the link among poverty, economic growth and adjustment policies in Ivory Coast. The author uses the Lorenz Curves to analyze inequality in the size and distribution of income, arguing that the Lorenz curve is independent of the size of the mean income but any shift in the curve will change inequality. The author decomposes poverty into two components, i.e. the impact of growth on poverty when income is held constant and the effect of income distribution when total income of the society does not change. This approach helps us compute the components using one time period data.

Kabubo and Kiriti (2002) use the direct approach developed by Kakwani and modified by Ali (1992) to link adjustment policy to poverty and growth. Data from the WMS of 1992, 1994 and 1997 is used to assess the impact of macroeconomic policy changes on poverty. The authors focus on the nature and extent of poverty and inequality during the SAPs, the relationship between poverty and growth and the link between macroeconomic adjustment policies and poverty in Kenya. The authors estimate the FGT class of decomposable poverty indices. Their results indicate that the incidence of poverty decreased by 8% (1992-1994) and severity of poverty decreased by 6%, which they attribute to the improvement in macroeconomic policies.

Mukui (1995) assessed the extent of and changes of poverty in Kenya during the 1960's and 1990's and found that in rural areas, the percentage of population living in poverty remained high at about 47%.

Earlier works that have focused on making comparisons of inequality and social welfare more robust to the choice of ethical indices are Kolm (1969); Atkinson (1970); Dasgupta et al (1973) ; Foster (1998); Shorrocks and Foster, (1988b) and Zheng (1999). Most recent literature has pointed out that similar robust is desirable for poverty measures. Atkinson (1987), Foster and Shorrocks (1998a, b) emphasize this especially in the light of uncertainty due to frequent lack of agreement regarding the setting of poverty lines.

Recent works on poverty and inequality analysis have employed the importance of various forms of stochastic dominance relationship between income distributions. In

particular Anderson (1996), Davidson and Duclos (2000) have discussed the importance of the concept of first, second and third order stochastic relationships between income distributions for social welfare and poverty ranking distributions.

Quisumbing et al. (1995) carried out a study to ascertain if women are disproportionately represented among the poor as has been used to justify targeting of poverty alleviation policies and projects to women. Before applying stochastic dominance analysis, per capita expenditure measures revealed more women below the 33% poverty line in 7 out of 11 data sets. The authors also found that in 7 out of 11 data sets, the poverty gap was larger for female-headed households than in male-headed households. Per adult equivalent measures showed that in 8 out of 11 data sets, more female-headed households were poorer than male-headed households.

Stochastic dominance results revealed a different picture. In most of the cases, the differences between male and female poverty levels were not statistically significant enough to conclude that one group was better off than the other was. In first-degree stochastic dominance analysis of per capita measures and adult equivalent measures, 10 out of 11 data sets revealed no dominance by either male-or female-headed households. Second-degree stochastic dominance analysis showed that while male-headed household dominated in most cases, the curves were not sufficiently different to conclude that there was significant difference between male and female poverty levels.

Duclos and Makdissi (1999) developed methods for testing whether ordinal orderings are robust over large data sets of equivalent scales, poverty lines and poverty indices. The authors develop sequential stochastic dominance conditions that throw light on the robustness of poverty comparison. The results are briefly illustrated using data sets for four countries drawn from the Luxembourg Income Study databases. The authors use methods that rely on first order multidimensional stochastic dominance and extend them to any arbitrary order of dominance, to the alternative choice of individual or household based aggregation. They find that poverty is robustly higher in Canada than in Finland when individuals rather than households are used as aggregating units.

Madden (2000) carried a study on poverty in Ireland using the stochastic dominance approach and household budget survey for 1987 and 1994. The author also included tests for the statistical significance of the results. Madden found that for a wide range of

absolute poverty lines, the poverty level in Ireland fell over the 1987-1994 period. When relative poverty lines are used, second order dominance for 1987 over 1994 is found and third order dominance for 1994 over 1987 in the case of expenditure.

## 2.3 Overview of Literature

The reviewed literature shows that analysis of living standards have concentrated on poverty, inequality decomposition and growth while welfare is proxied by per adult equivalent expenditures in most regressions. Most of the studies employ the FGT measures of poverty or other summary measures. They have emphasized the importance of household characteristics, for example, household size, education level, access to social services, and employment of house head in determining poverty levels. Though the approaches employ different methodologies, explanatory variables and poverty lines, the comparisons point to the possibility of getting different policy conclusions as per the approach used.

Most of the studies on poverty and inequality in Kenya have used the summary measures to determine their extent and level, while no emphasis has been accorded to dominance analysis. The robustness of such poverty measures using summary measures (means and variances) can be compromised by errors in living standards data, unknown differences between households at similar consumption levels, uncertainties and arbitrariness in both the poverty line and precise poverty measure<sup>15</sup> (Ravallion, 1994).

Most recent literature has pointed out that robustness is desirable for poverty measures. Atkinson (1987), Foster and Shorrocks (1998a, b) emphasize this especially in the light of uncertainty due to frequent lack of agreement regarding the setting of poverty lines..

Deaton (1997) puts it "... the reduction of a distribution to a single number is perhaps a lot more aggregation than we want, and more fundamental insights into the levels of living can be obtained from graphical representation of either the whole distribution or some part of it" (pp. 158). This study employs stochastic dominance analysis to study poverty trend in Kenya, a method whose novelty is its ability to overcome the difficulties associated with analyses which use specific poverty lines.

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<sup>15</sup> Dominance conditions are more robust than comparisons based on mean and variances of distributions. On the use of dominance conditions in terms of measures of poverty, see Atkinson (1987), Foster and Shorrocks, (1988b) and Howes (1994b).

## CHAPTER THREE: METHODOLOGY

### Introduction

As earlier stated, results from poverty studies are frequently sensitive to the choice of poverty line and poverty measure. Potentially different results could be obtained by the choice of a different poverty line/measure hence few conclusions can be drawn if poverty trends differ substantially when different poverty measures are applied or the position of the poverty line is changed.

Poverty dominance analysis uses stochastic dominance to provide rankings of distributions in terms of poverty, which are not sensitive to the choice of poverty line. Stochastic dominance, in relation to poverty involves ranking of income/expenditure distributions, i.e. it examines whether one distribution has unambiguously more or less poverty than another over a range of potential poverty lines.

Application of the theory of stochastic dominance to poverty analysis permits a more robust comparison by ranking distributions, which would not have been possible simply from the comparison of the mean and variance of the variations.<sup>16</sup> It allows poverty comparisons to be made without prior specification of the poverty line.

### 3.1 Stochastic Dominance and Poverty Dominance Analysis<sup>17</sup>

Studies of poverty typically present results for a variety of poverty measures. There is a wide range of such measures but the following three measures are among the most popular: From equation 1, (a) the headcount ratio,  $P_\alpha = 0$  (b) the income gap measure,  $P_\alpha = 1$  and (c) poverty severity, where  $P_\alpha = 2$ .<sup>18</sup> These are now briefly explained. Suppose we have  $n$  households with income/expenditure  $x_1, x_2, \dots, x_n$  and the poverty line is  $z$ . Then if  $q$  households have incomes below  $z$ , the headcount ratio ( $H$ ) is simply  $= q/n$ . However, the headcount ratio has a number of deficiencies as a poverty measure, the most important of which are the fact that it takes no account of the depth of poverty and that it does not satisfy the principle of transfers (i.e. it is unchanged following a transfer of income from a poor to a less poor household when both households are below the

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<sup>16</sup> See Hadar and Russell, 1969.

<sup>17</sup> This paper draws substantially from Madden and Fiona (2000), for details see references. I remain solely responsible for any errors thereof.

<sup>18</sup> See Foster *et al.*, 1984.

poverty line). The first of these deficiencies can be remedied by the choice of an income gap measure as our poverty measure. The income gap measure sums all the proportionate shortfalls below the poverty line for poor households:

$$\sum_{i=1}^q \frac{z - x_i}{z} \dots\dots\dots (8).$$

This measure is then normalized by dividing by the total number of households, n. This can also be expressed as H.I where

$$I = \frac{z - x_p}{z} \dots\dots\dots (9),$$

and  $x_p$  is average income for poor households. This measure takes account of the depth of poverty but does not satisfy the principle of transfers. To take account of the principle of transfers we use the FGT  $P_\alpha$  measure when  $\alpha = 2$ . This measure weights the income gaps by the gaps themselves thus awarding a higher weight to poorer households. Thus we have,

$$P_2 = \frac{1}{n} \sum_{x_i \leq z} \left( \frac{z - x_i}{z} \right)^2 \dots\dots\dots (10).$$

When  $\alpha = 0$  this measure equals H, and when  $\alpha = 1$  the measure equals H.I. This approach suffers from two drawbacks however. First, the rankings of different income distributions in terms of poverty may be sensitive to where the poverty line, z, is drawn. Second, the ranking may be sensitive to the particular poverty measure chosen. Poverty dominance addresses both of these issues. Poverty dominance analysis is an application of stochastic dominance to distributions of households' income. Suppose we have two distributions with Cumulative Density Functions (CDF), F(x) and G(x) respectively. Then, the CDF of F(x) first-order stochastically dominates G(x) if and only if, for all monotone non-decreasing functions  $\alpha(x)$ :

$$\int \alpha(x) dF(x) \leq \int \alpha(x) dG(x) \dots\dots\dots (11),$$

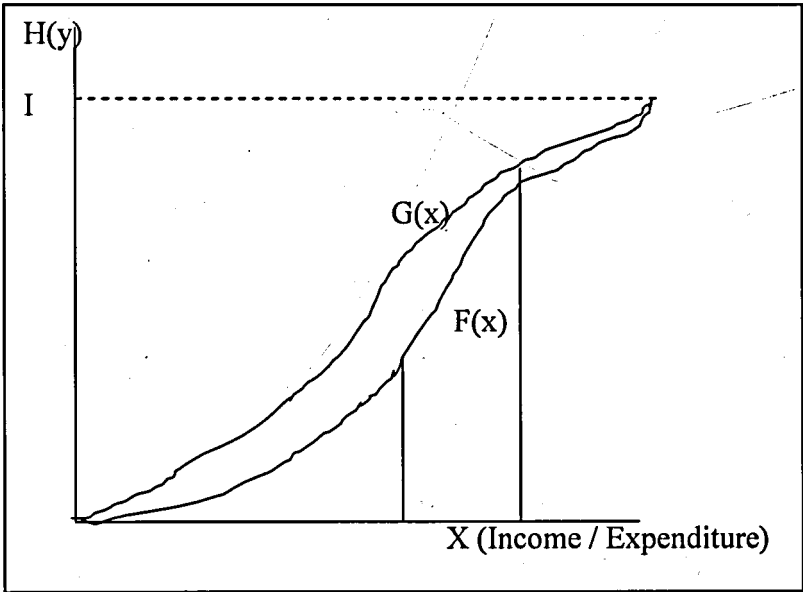
where the integral is taken over the whole range of x. Thus the average value of  $\alpha$  is at least as large in distribution F as it is in distribution G, as long as the valuation function is such that more is better, i.e. it is monotone non-decreasing. In this sense, distribution F

stochastically dominates distribution G. An equivalent way of expressing this is to say that for all x,

$$G(x) \geq F(x) \dots\dots\dots (12),$$

so that the CDF of distribution G is always at least as large as that of distribution F, i.e. distribution G always has more mass in the lower part of the distribution. In terms of a diagram, the cumulative distribution points  $H(y)$ , on the vertical axis, are proportional to the area under the curves and to the left of X. As seen from Figure 2, distribution  $G(x)$  is everywhere above distribution  $F(x)$  and so the probability of getting at least x is higher under  $F(x)$  than  $G(x)$ , thus  $F(x)$  first-order stochastically dominates  $G(x)$ .

**Figure 2: First-Order Stochastic Dominance**



Source: Madden and Fiona, (2000).

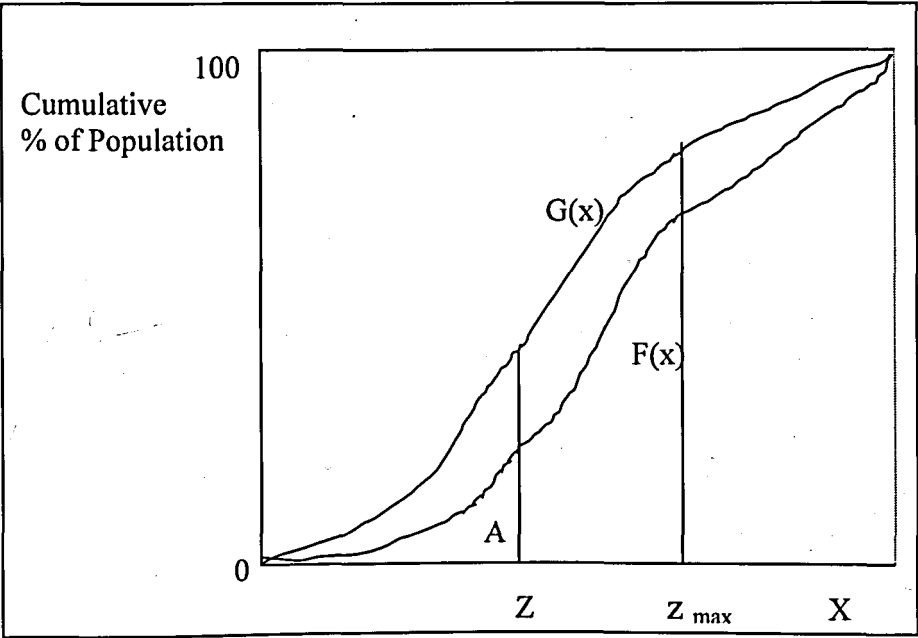
We now proceed to show how this is related to poverty and inequality analysis. Suppose we decide upon a poverty line and denote it as z. If we have n households in total and if q households have income below z, then as outlined above, the headcount ratio, is  $P_0 = q/n$ . In this case, the CDFs are referred to as PICs and each point on the graph gives the proportion of the population consuming less than or equal to the amount given on the horizontal axis. The cumulative distribution points are equivalent to head-count ratios in

the sense that they represent the proportion of the population at and below a particular income level. Suppose we do not know the poverty line  $z$ , but we are sure it does not exceed  $z^{\max}$ . Under these circumstances, “poverty will fall between two dates if the poverty incidence curve for the latter date lies nowhere above that of the former date, up to  $z^{\max}$ . This is called the First-order Dominance Condition (FOD)<sup>19</sup>. In other words if, for all poverty lines up to  $z^{\max}$

$$G(x) \geq F(x),$$

then  $P_0$  will always be higher for the first distribution than the second, i.e. the poverty ranking of two distributions according to the headcount ratio is robust to all choices of the poverty line up to  $z_{\max}$  if, and only if, one distribution stochastically dominates the other. As shown in Figure 3, the distribution  $G(x)$  is everywhere above that of distribution  $F(x)$  and so poverty is higher for  $G(x)$  than  $F(x)$ , no matter where the poverty line is drawn. This reflects the fact that the proportion of people consuming less than or equal to  $z_{\max}$  is always greater with distribution  $G(x)$  than with distribution  $F(x)$ . We can thus conclude that distribution  $F(x)$  first-order poverty dominates distribution  $G(x)$ .

**Figure 3: First-Order Poverty Dominance**

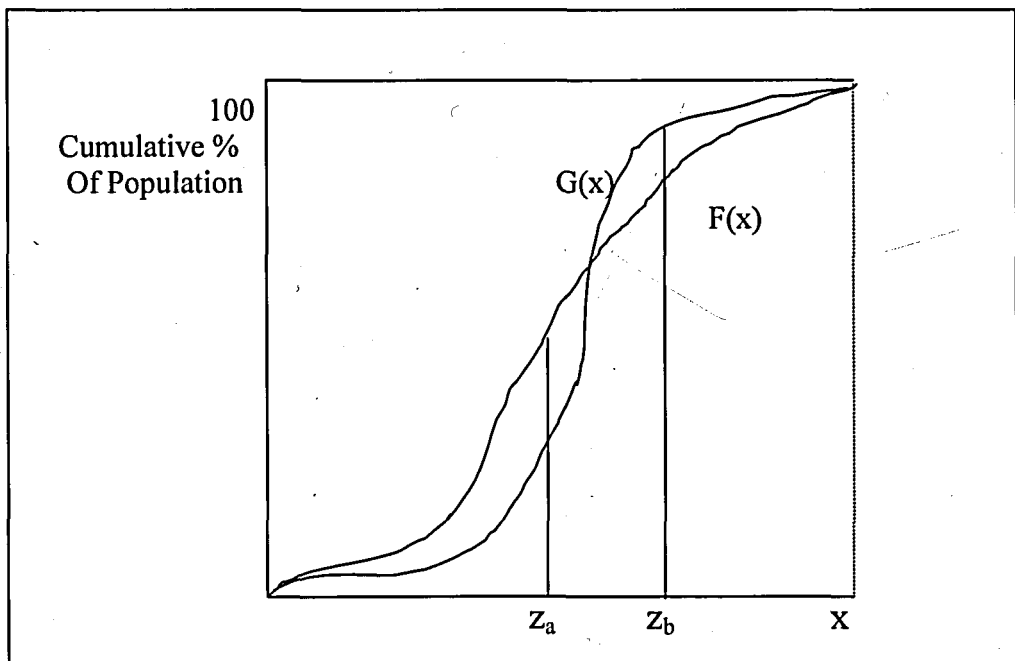


Source: Madden and Fiona, (2000).

<sup>19</sup> See Ravallion and Bidani, 1994.

If the curves intersect, as in Figure 4, then the ranking is ambiguous. For example, if the poverty line was set at  $Z_b$ , then distribution  $G(x)$  will lie above distribution  $F(x)$ . If the poverty line however, is set at  $Z_a$  then distribution  $F(x)$  will lie above distribution  $G(x)$ . Poverty thus at  $Z_b$  is higher with distribution  $G(x)$  but at  $Z_a$  poverty is higher with distribution  $F(x)$ . We cannot therefore explicitly state that one distribution exhibits poverty dominance over the other as their ranking in terms of poverty changes depends on where the poverty line is drawn.

**Figure 4: Crossing of Poverty Incidence Curves**



Source: Madden and Fiona, (2000).

In this case we impose more structure on our valuation function  $\alpha(x)$  and hence equivalently on the range of admissible poverty measures. This leads us on to the second type of stochastic dominance known as second order stochastic dominance. We say that distribution  $F(x)$  second-order stochastically dominates distribution  $G(x)$  if and only if, for all monotone non- decreasing and *concave* functions  $\alpha(x)$  the previous inequality holds i.e.

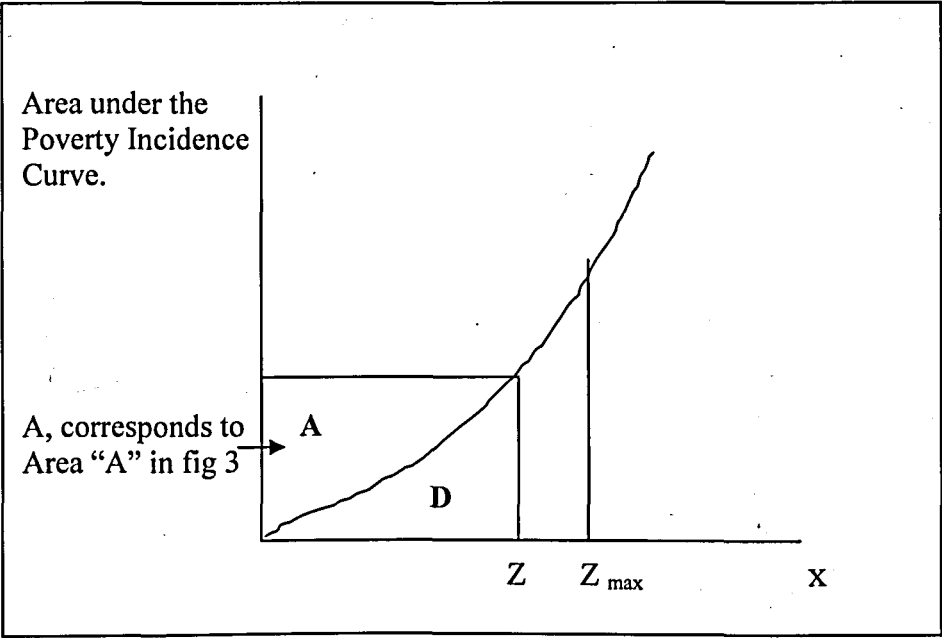
$$\int \alpha(x) dF(x) \geq \int \alpha(x) dG(x).$$

Once again, second-order stochastic dominance can be expressed equivalently as

$$D_G(x) = \int_0^x G(t)dt \geq \int_0^x F(t)dt = D_F(x)..... (13), \text{ so that}$$

second-order stochastic dominance is checked, not by comparing the CDFs themselves, but by comparing the integrals below them. When  $\alpha(x)$  is concave, we can interpret the integrals beneath them as additive social welfare functions with  $\alpha(x_i)$  being the social valuation (utility) function for individual ‘i’. In the case of poverty analysis, this implies that second-order dominance holds for measures that are strictly decreasing and at least weakly convex in the incomes of the poor, i.e. measures that are sensitive to the depth of poverty such as the income gap ratio. We can then employ the Second-Order Dominance Condition. To examine the robustness of the income gap ratio we must consider the “poverty deficit curve” which can be defined as the area under the CDF or the integrals of the CDF, as discussed above, up to some poverty line  $z$  (See Figure 5).

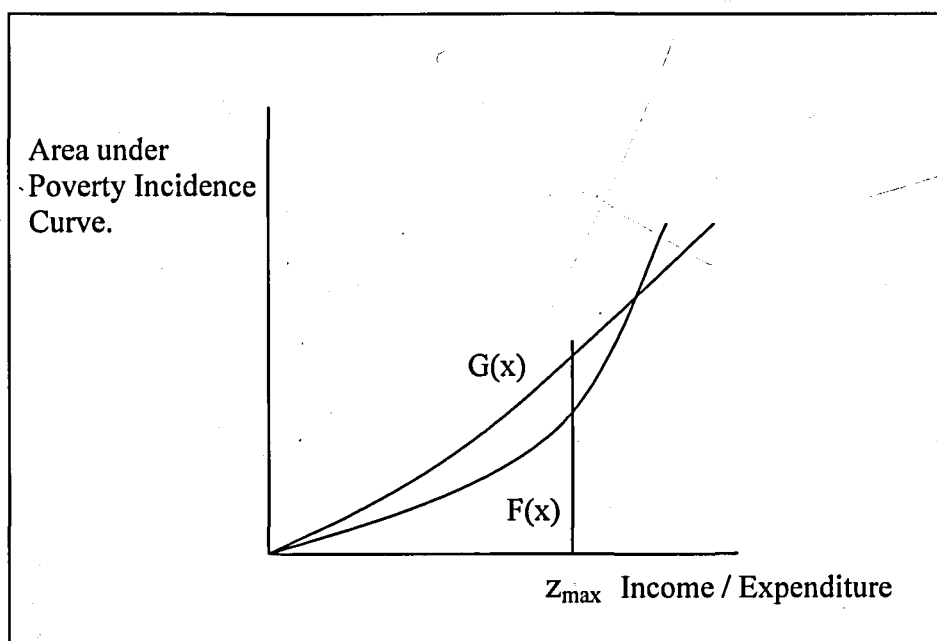
**Figure 5: Poverty Deficit Curve for  $F(x)$**



Source: Madden and Fiona, (2000).

In this case a fall in poverty requires that the poverty deficit curve is nowhere lower for the earlier date at all points up to the maximum poverty line and at least somewhere higher (see Figure 6). Poverty is thus higher for  $G(x)$ , in Figure 6, as its poverty deficit curve is above that for  $F(x)$  up to  $z_{\max}$ . As previously mentioned, this result will hold for a measure that is sensitive to the depth of poverty such as the income gap ratio but not the head-count ratio. Second-order stochastic dominance is a concept that is weaker than first-order stochastic dominance as first-order stochastic dominance implies second-order dominance but not vice versa.

**Figure 6: Poverty Deficit Curves for  $F(x)$  and  $G(x)$**



Source: Madden and Fiona, (2000).

Once again, there is no guarantee that second-order dominance will hold and so once again, we might be interested in putting further restrictions on the valuation function  $\alpha(x)$  or equivalently the underlying poverty measures. Suppose we add the further restriction to  $\alpha(x)$  that its third derivative be non-negative, i.e.  $\alpha''' \geq 0$ .<sup>20</sup> This is the case of third-order stochastic dominance and it is equivalent to imposing the condition that our poverty

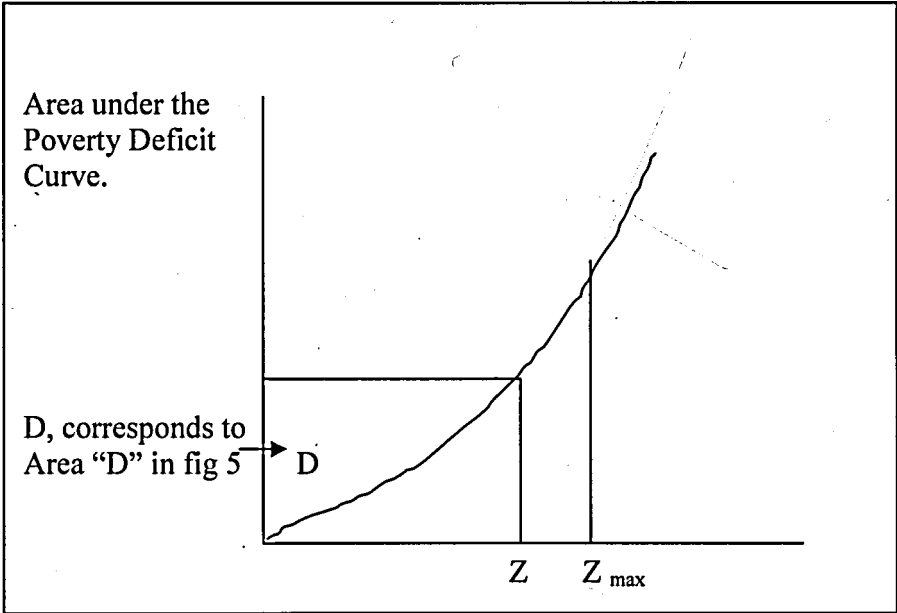
<sup>20</sup> See Lambert, 1992, pp 73.

measure places a higher weight on the poverty gaps of poorer households.<sup>21</sup> Thus once again we have the original dominance condition except that now we restrict  $\alpha(x)$  to be monotone non-decreasing, concave and with a non-negative third derivative with the equivalent condition

$$SG(x) = \int_0^x D_G(t) dt \geq \int_0^x DF(t) dt = SF(x) \dots\dots\dots (14)$$

i.e. we are now examining the areas under the poverty deficit curves which we label the *poverty severity curve*. Figure 7 shows the poverty severity curve for distribution  $F(x)$ .

**Figure 7: Poverty Severity Curve for  $F(x)$**



Source: Madden and Fiona, (2000).

In principle, it is possible to examine higher orders of stochastic dominance but in practice, it is rare to go beyond third order. As discussed above, if any given order of dominance does not hold then it is always possible to investigate if a higher order holds. This is equivalent to imposing more restrictions of the valuation function (poverty measure). In the case of poverty dominance, this involves restricting the range of the

<sup>21</sup> These corresponds to the FGT  $p_\alpha$  measures when  $\alpha>1$

poverty line over which we search for dominance. Thus, while in general we are interested in the entire distribution of the CDFs up to the maximum value of the poverty line  $z_{\max}$ , we may also be concerned with the behaviour of the CDFs between a lower bound estimate,  $z_{\min}$  of the poverty line and an upper bound estimate  $z_{\max}$ .

It was Atkinson (1987) who first emphasized that in poverty analysis there is often a lower as well as an upper limit for the poverty line and it may turn out that the distributions do not cross between these limits, so that first-order dominance may hold for this range of income/expenditure, if not for all values of  $z$  up to  $z_{\max}$ . This leads to another definition of stochastic dominance known as "poverty-mixed dominance". This definition is a combination of first and second-order dominance. "Poverty-mixed dominance" essentially requires that distribution 'F' display second-order dominance over distribution G from zero to the lower bound poverty line  $z_{\min}$  and first-order dominance from  $z_{\min}$  to  $z_{\max}$ .<sup>22</sup>

It is worth emphasizing the link between poverty measures and social welfare. For example, by inserting a minus sign in front of H we obtain an unusual social welfare function, which assigns a negative value of  $1/n$  to every poor household (i.e. with income below  $z$ ) and zero to every other household. This measure is non-decreasing in individual household incomes but the discontinuity at  $z$  implies that it is non-concave and does not obey the principle of transfers. Similarly, inserting a minus in front of a gap measure such as I, will also give a form of social welfare function whereby the contribution of each individual to social welfare moves from  $-1$  to zero and remains at zero for income values above  $z$ . Finally, a social welfare measure based upon a  $P_\alpha$  measure where  $\alpha > 1$  is strictly concave below  $z$  and is thus sensitive to the degree of inequality among the poor. Alternatively, if we regard the valuation function  $\alpha(x)$  as simply being a utility function  $u(x)$ , then the stochastic dominance results outlined above can be interpreted as welfare dominance results.<sup>23</sup>

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<sup>22</sup> An application of poverty mixed dominance to poverty can be found in Ferreira, et al (1998).

<sup>23</sup> See Foster and Shorrocks, (1988b).

It is also worth noting that dominance results in poverty may also be obtained using what Jenkins and Lambert (1997) term Three 'I's of Poverty (TIP) curves. These curves are related to the poverty deficit curves outlined above and to the Generalized Lorenz curves of Shorrocks (1983).

### 3.2 Extensions to Inequality

Inequality measures are indices of disparities among individual levels of well being. They include among others variance, coefficient of variation, Gini coefficient and Theil index. We have an analogy between poverty indices, which are distribution sensitive, and inequality measures. Somehow, inequality is equivalent to considering a very high poverty line. However, analogy is very strict for dominance results. Inequality dominance conditions are as follows:

**First order dominance:** Distribution A is "socially preferable" to distribution B if the poverty headcount is lesser with A for all possible poverty lines. This implies that the cumulative density function associated with A must be everywhere below that associated with B.

**Second order dominance:** Distribution A is "socially preferable" to distribution B if the poverty gap is lesser with A for all possible poverty lines.

To summarize, if we find that the cumulative distribution functions do not cross, we need look no further because poverty rankings for all measures will be robust to the choice of poverty line. If they do cross but the poverty deficit curves do not, then rankings based on measures that are sensitive to the depth of poverty will be robust. If the poverty deficit curves cross but the poverty severity curves do not, then rankings based on poverty measures that are distribution sensitive will be robust. Finally, if first-order dominance holds between a lower and upper bound estimate of the poverty line and then second order dominance holds for all values up to the lower bound estimate of the poverty line then "poverty-mixed dominance" holds. We will apply these techniques to Kenyan data from 1994 – 1997 across region and over time.

## CHAPTER FOUR: RESULTS

### 4.0 An Application of Poverty Dominance to Kenya

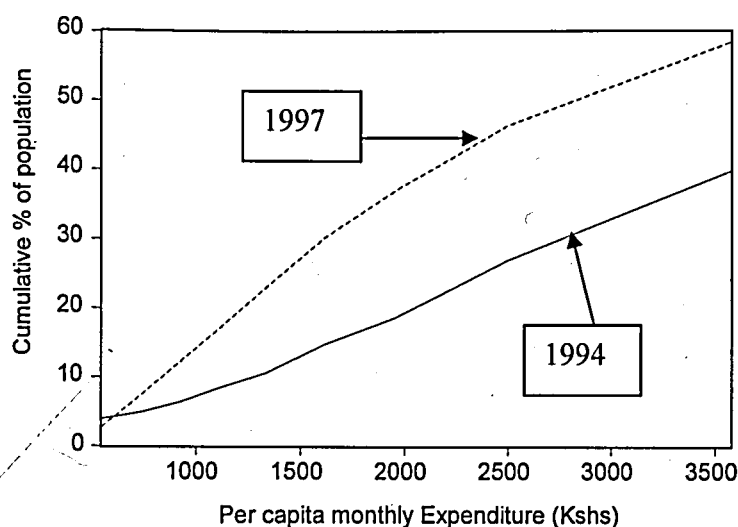
In this section, we apply the ideas from Chapter three to data from the WMS of 1994 and 1997. These are nationally representative surveys carried out to collect a variety of information concerning consumption, expenditure and income patterns, employment, education, health, fertility, crops and livestock, child nutrition and social amenities in excess of 10,000 households. These variables have a direct relevance in understanding the magnitude, severity and dimensions of poverty among different socio-economic groups. In particular, WMS II of 1994 covered 47 districts, 1,180 clusters, 10,880 households comprising of 59,183 individuals. The WMS III of 1997 covered 46 districts, 1,107 clusters, 10,873 households with a total of 50,705 individuals. Using the main data sets, this study has grouped households into districts, then regions and their per capita monthly expenditure levels calculated and divided into deciles (See Table A1 in the Appendix).

In this section, we examine whether first or second-order dominance exists over the entire range of expenditure values from zero to the upper bound estimate of the poverty line  $z_{\max}$ . We also examine if first-order dominance exists between a lower bound estimate of the poverty line,  $z_{\min}$ , and an upper bound estimate  $z_{\max}$ .

Figure 7 shows the Cumulative Distribution Functions of household expenditure for the entire sample for 1994 and 1997. The x-axis represents equivalent expenditure where expenditure is displayed in Kenya shillings. The y-axis represents the cumulative percentage of the population with at least x amount of per capita monthly expenditure which of course corresponds to the head-count ratio. The points along the horizontal axis, from zero to a maximum level, can also be designated as a set of plausible poverty lines. The proportion of the poor is then found by reading off the proportion of the population from the vertical axis that consumes less than the given amount on the horizontal axis. So how do we determine whether dominance holds? One approach is to simply visually inspect the graphs. Clearly, the figure shows that 1994 dominates 1997 distribution i.e. the CDF of 1997 is everywhere above that of 1994. As discussed in chapter three, if the Cumulative Distribution (or Poverty Incidence Curve) for time period A lies everywhere

above the curve for time B, this represents First Order Dominance, and it implies that poverty is unambiguously lower in B than A. This shows that there was no improvement in the welfare of Kenyans between 1994 and 1997, infact a worsening of living standards as measured by the Consumption Expenditure per Adult Equivalent.

**Figure 7: Cumulative Distribution Functions of CPAE<sup>24</sup> for Kenya**



We note that poverty lines at the very top of the distributions are usually implausible. This implies that it is not necessary to apply stochastic dominance criterion over the entire distribution of consumption expenditure per adult equivalent. We truncate the distribution to include adult equivalent expenditure levels no higher than Kshs 3,576.09 p.m (about twice the poverty line of one dollar per day). Given the increase in poverty over the years, it is not surprising that the dominance analysis reveals that the welfare of the households in this expenditure bracket worsened gradually over time especially over the middle expenditure groups. These results which are robust to the choice of poverty line confirm the results from past studies, which show that poverty has been increasing in Kenya since 1994.

<sup>24</sup> CPAE stands for Consumption Expenditure Per Adult Equivalent

4.1 Changes in Household Welfare by Region in 1994-1997

In this section, we examine whether the changes in national welfare are reflected in the regional levels by conducting stochastic dominance analysis for different regions. We analyze them jointly to provide within year inter-regional comparisons that are robust to the choice of poverty line, and individually, to highlight inter-temporal changes in welfare distribution within each region. The results are shown in figures 8a-8d and A1-A4 in the Appendix.

Cumulative Distribution Functions of CPAE by Region, 1994

Figure 8a

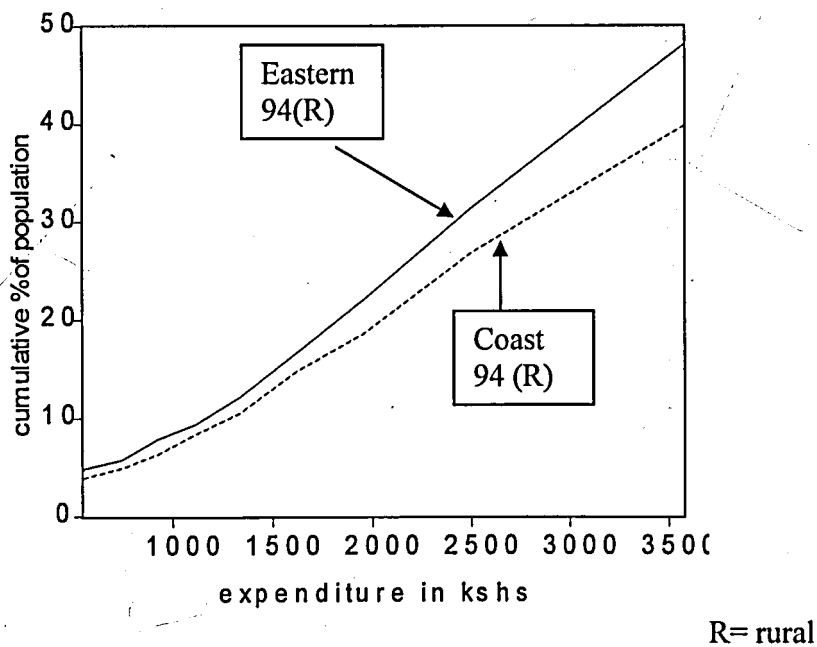


Figure 8b

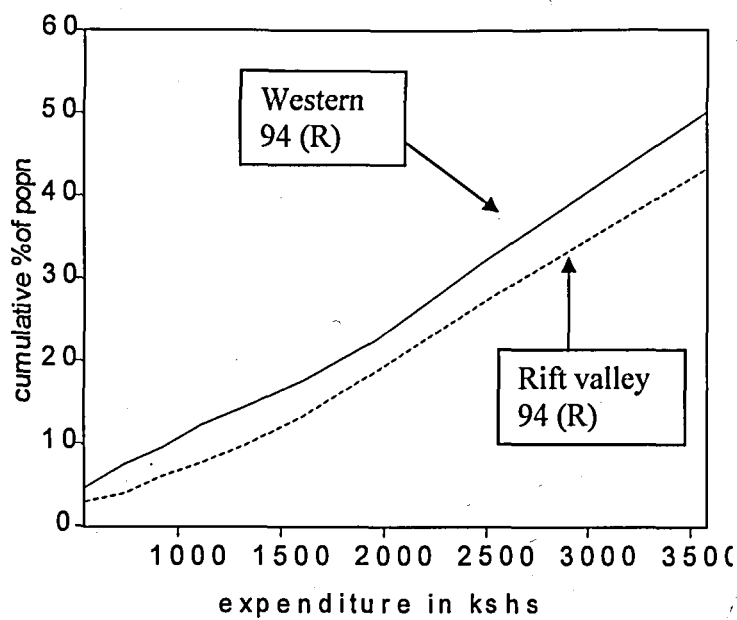
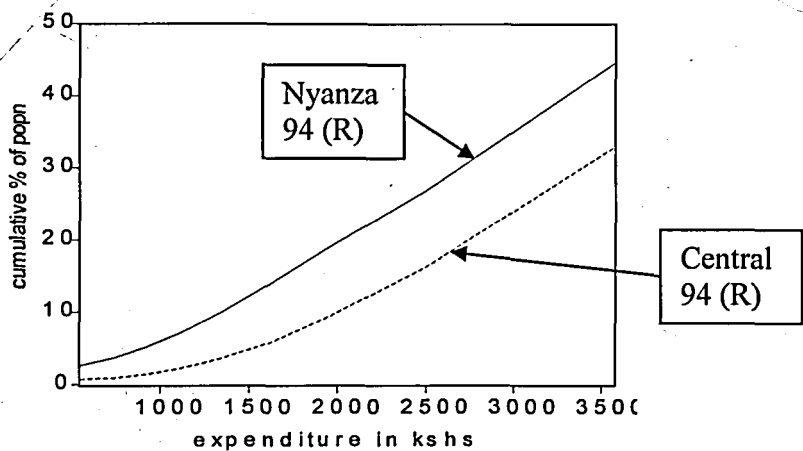
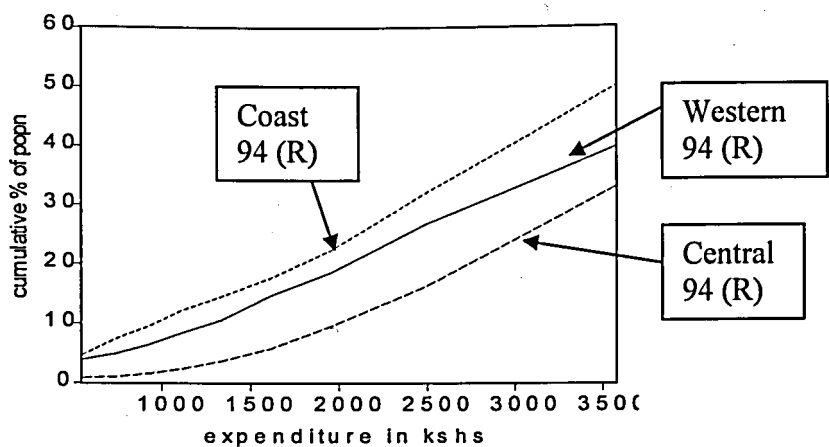


Figure 8c



**Figure 8d**



The distribution in figures 8a-8d confirm the widely known poverty story in Kenya that living standards in Central region dominate those in the rest of the country irrespective of where the poverty line is chosen. The welfare distribution ranking is consistent with findings of previous studies that used specific poverty lines in the sense that Central enjoys the highest standard of living, followed by Nyanza, Rift valley, Western, Coast, Eastern and lastly North Eastern in 1994.

**Cumulative Distribution Functions of CPAE by Region, 1997**

**Figure 9a**

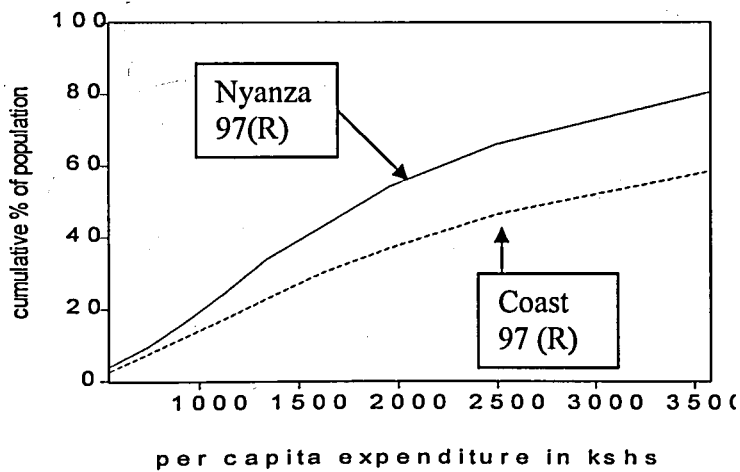


Figure 9b

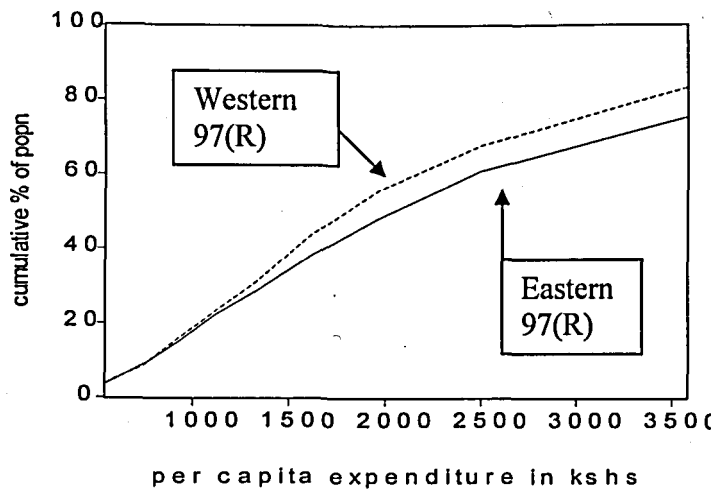


Figure 9c

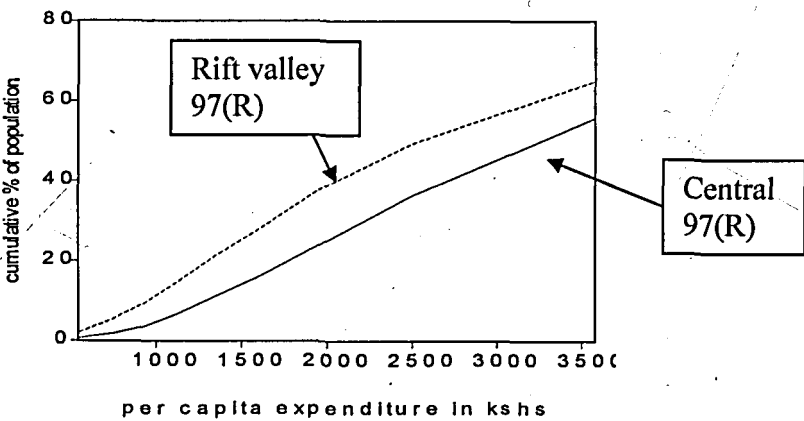
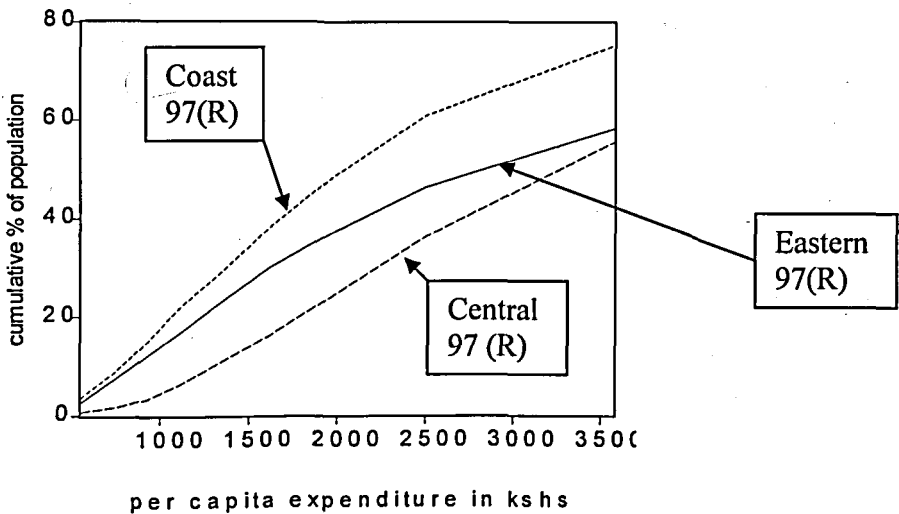


Figure 9d



Figures 9a-9d show the CDF of CPAE in 1997 by region. What is striking is the distribution functions for 1997, which show that first order stochastic dominance does not conclusively rank Coast against Rift Valley and Nyanza against Western (see A5 and A6). Beyond Kshs1,800 Coast region dominates Rift Valley but for per capita expenditure below this, Rift Valley dominates. For the case of Nyanza and Western, no conclusive judgement can be made for per capita expenditures below Kshs 1,500, beyond this western slightly dominates Nyanza though the distribution functions are quite close. The dominance ranking in 1997 slightly differs from that of WMS in that Western region is better off than Eastern though it can be noted that the CDF are very close. The Central region again has the highest standards of living with Nyanza and North Eastern being the lowest welfare regions.

Within each region, the 1994 distributions dominate those of 1997 for all regions contrarily to the findings by WMS that there were improved welfare levels in Central region (See Appendix A7-A9).

#### **4.2 Changes in Welfare among Rural and Urban Households**

Figure 10a shows that the rural households suffered welfare deterioration in 1997 as compared to 1994. It also shows that poverty is a rural phenomenon as indicated in figure 10b.

Figure 10a

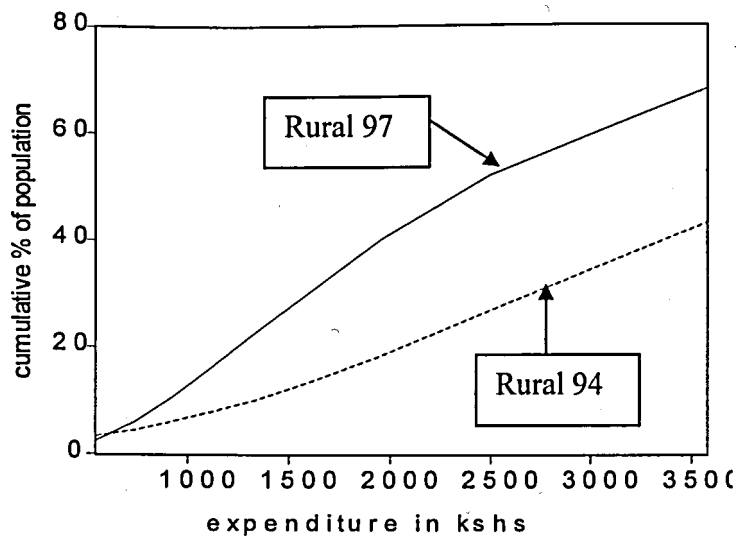
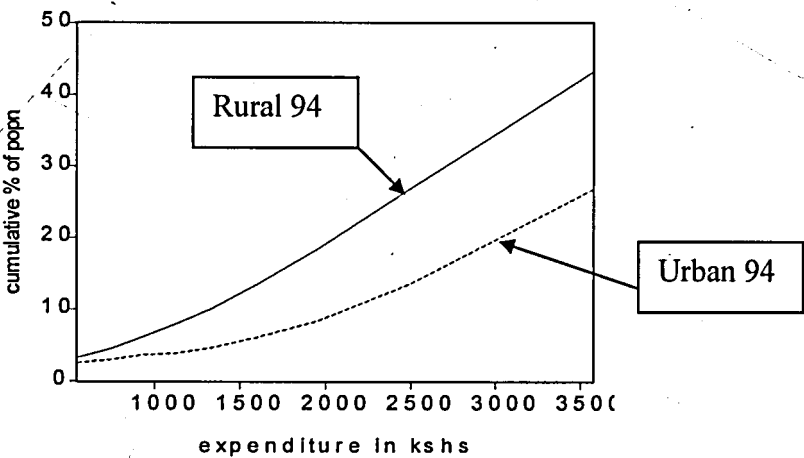


Figure 10b



To summarize, so far we have found that first order poverty dominance holds for the years of 1994 and 1997 over what the study regards a reasonable range of expenditure levels. Thus it is possible to say with a fair degree of confidence that poverty in 1994 was lower than in 1997. Note that given the findings of first order dominance there is no need to search for second or third order dominance since a finding of any degree implies that higher degrees of dominance must also hold.

### **4.3 Limitations of the Study**

1. The expenditure patterns were collected over a short period and this may not be reliable to measure consumption particularly for mature households which may have a large stock of durables from which they derive services. Expenditure on some items such as alcohol and tobacco are typically under-reported. However, other comparative studies have used the same data hence not a serious problem.
2. Due to lack of comparability and the large volume of data sets, the 1992 WMS data was excluded from this study. The study also does not benefit from recent data sets as no WMS has been conducted since 1997. Infact, the CBS is currently conducting a WMS. This will be useful in future studies.
3. Due to resource constraints, this study was not able to carry out dominance tests to arrive at a profile of poverty across various other dimensions such as decomposition by employment status, gender and household headship.

## **CHAPTER FIVE: CONCLUSIONS AND POLICY IMPLICATIONS**

### **5.0 Conclusions**

We have demonstrated in this paper that, irrespective of the choice of poverty line, there was widespread deterioration in welfare across regional and socioeconomic groupings between 1994 and 1997.

This paper has advanced the analysis of poverty in Kenya in a number of directions. It employs Welfare Monitoring Survey data and permits comparison with previous work on poverty in Kenya using different methodologies. It also applies stochastic dominance techniques; a method whose novelty is its ability to overcome the difficulties associated with other analysis which use specific poverty lines. We find that poverty in Kenya in 1994 was lower than in 1997 for a fairly wide range of absolute poverty lines. However, we believe that the dominance results are important since they enable robust statements to be made regarding developments in poverty over the 1994 - 97 periods.

### **5.1 Policy Implications**

The results presented in this paper and other papers on poverty and inequality should enable policy makers to explore the challenges involved in achieving agreed upon local and international development goals. One such goal is to reduce poverty by half by the year 2015 as indicated in the MDGs. The achievement of this goal would allow Kenya to begin to make irreversible progress towards a better life. In the formulation of these goals, justifying the targeting of any alleviation policy and programmes to a category of people or region, ascertaining and monitoring the impact of such programmes and projects from time to time; the need for robust evidence is inevitable.

As mentioned in this paper and other studies, poverty is more prevalent in the rural areas and also in other specific categories of people such as female headed households and pastoralists. Eradication should therefore be focused in these areas as a priority.

While this paper provides considerable information on levels and characteristics of poverty and their evolution over time, it does not suggest modalities of reducing poverty.

Obvious recommendations revolve around identifying the most efficient and equitable means of investing in human resources and targeting of state transfers. Clearly, more work needs to be done on the links between policy and poverty, both in terms of examining how to achieve sustainable growth that includes the poor, and how to better prepare and protect human resources as Kenya follows a path of greater economic openness and reform.

The PPARs have broadened perceptions of the poor on the phenomenon of poverty. The reports reveal that the poor have been excluded in formulating policies aimed at alleviating poverty. The poor have over the years been reduced to passive participants in their own development, reducing their ownership of poverty alleviation programmes. They are not involved in formulating the policies and identifying the specific projects that will raise the level of development. Thus, the poor and vulnerable people and regions need to be integrated in the planning and implementation of poverty and inequality policies.

We also note that poverty is more than an economic problem i.e. it also has other dimensions. Political reforms are also vital to ensure that distribution of resources need not be prioritized on basis of political allegiance at the expense of other priorities. In addition, there is need to recognize non-state actors as key stakeholders in poverty reduction efforts and also identifying a number of targeted short term measures to directly address some critical causes and manifestations of poverty. Above all, major policy documents especially the PRSP need to be given enough political will to ensure that the envisaged goals and targets are achieved.

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Appendix

Figure A1

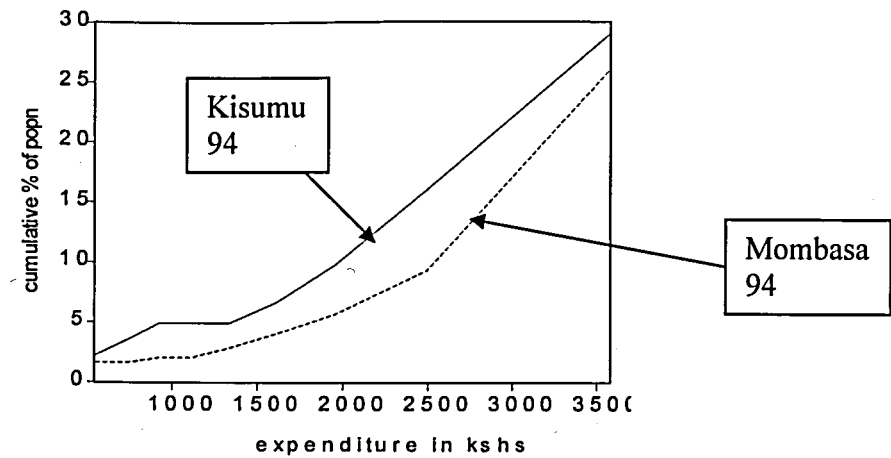


Figure A2

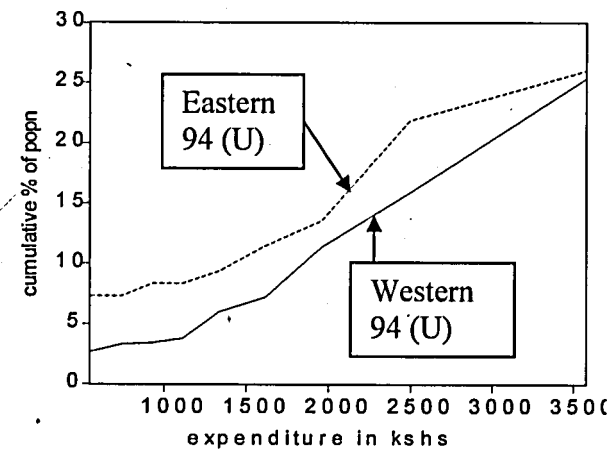


Figure A3

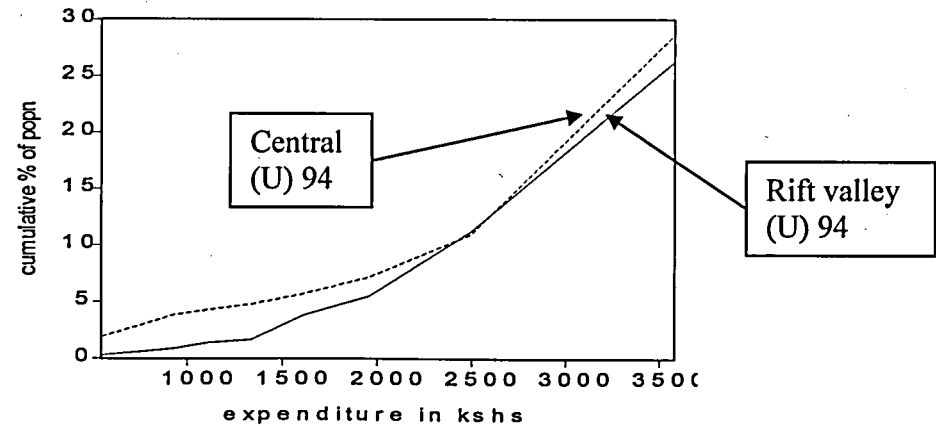


Figure A4

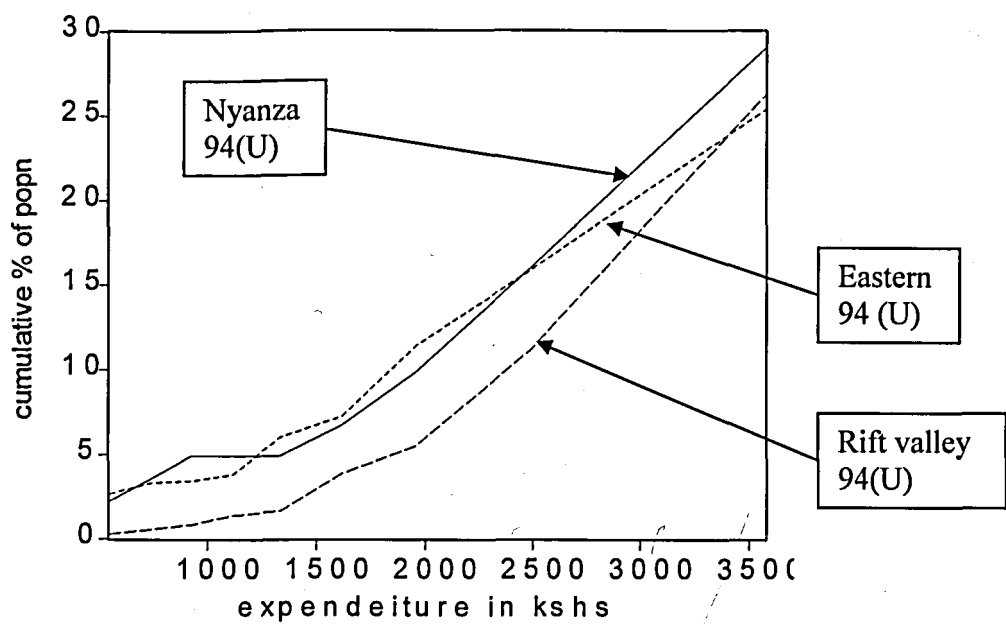


Figure A5

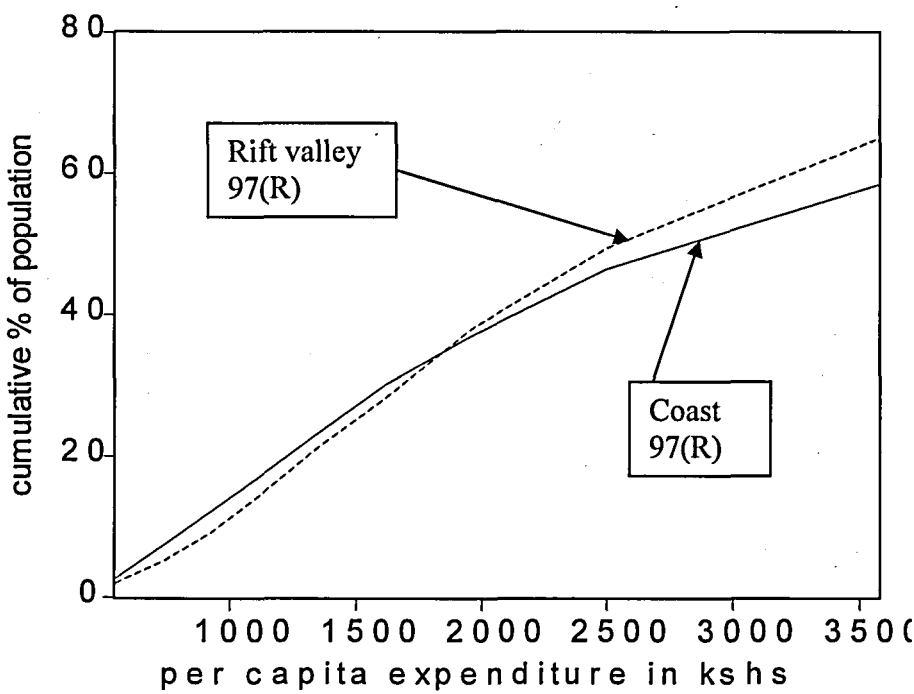


Figure A6

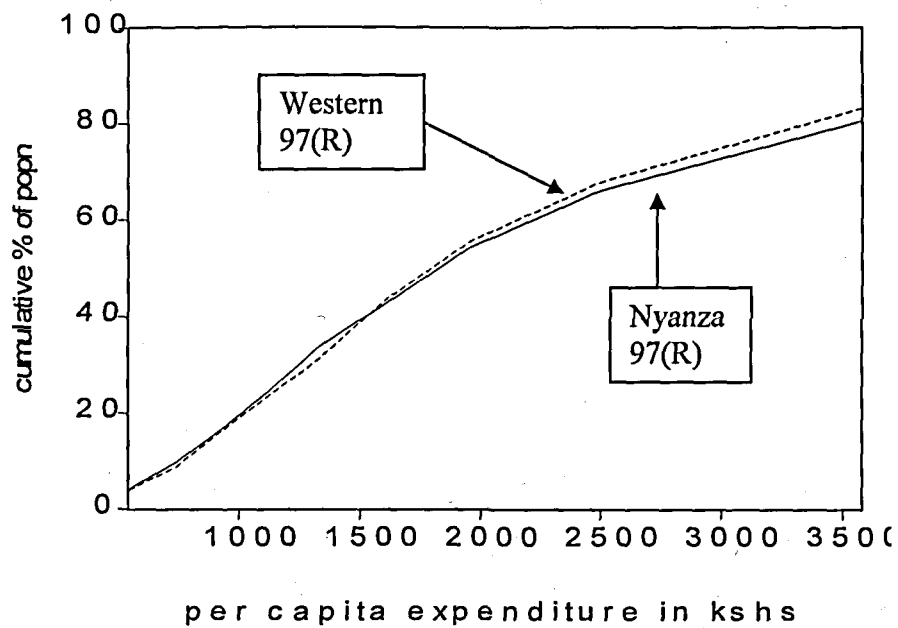


Figure A7

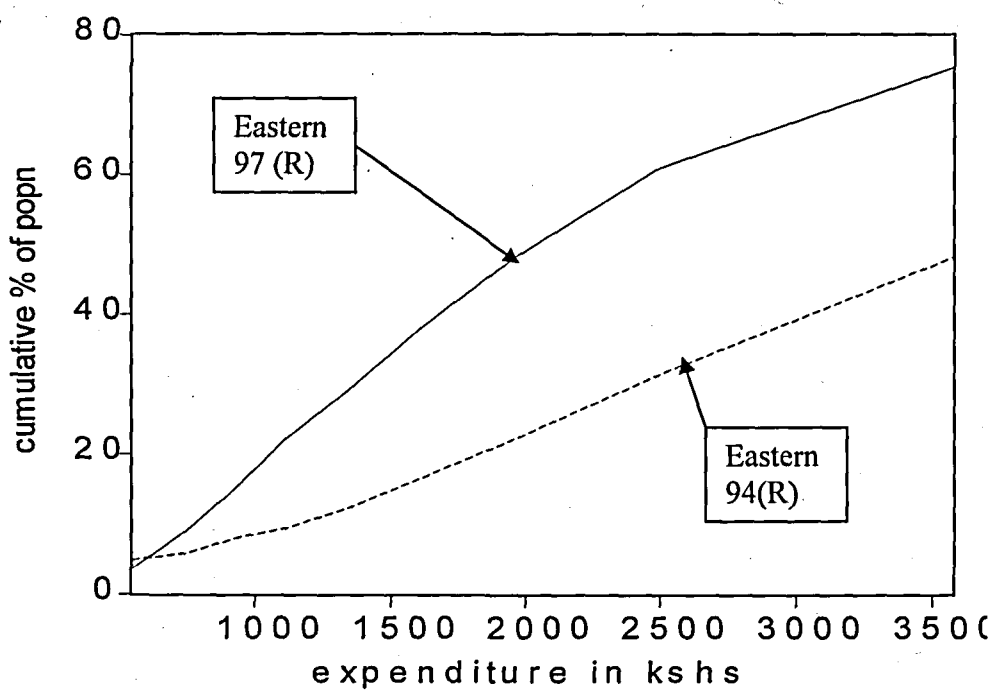


Figure A8

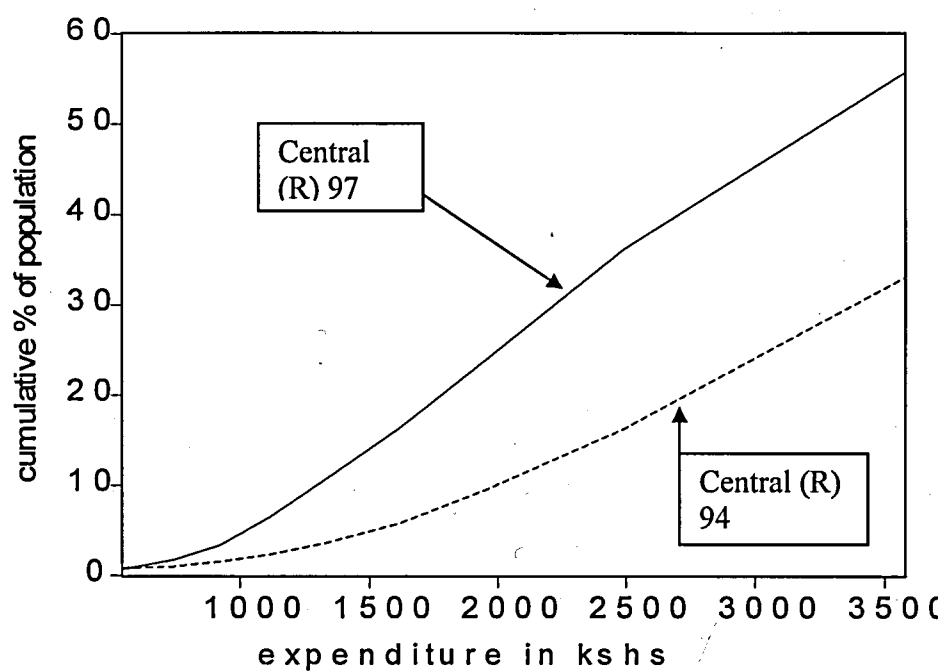
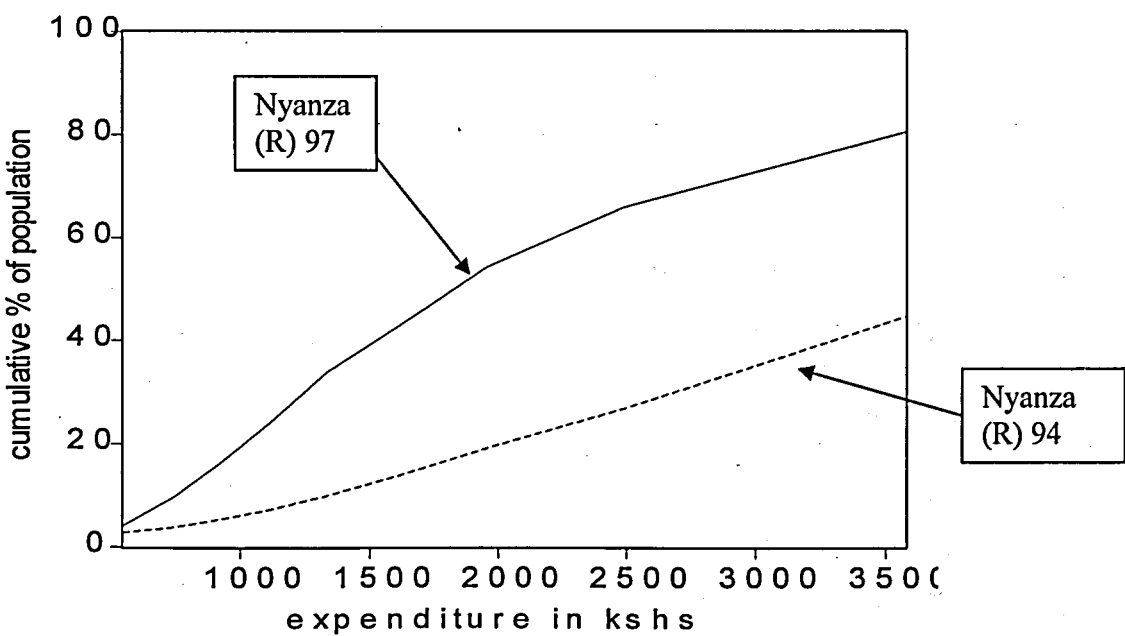


Figure A9



**Table A1: Expenditure Distribution by Household Deciles (Cumulative %).**

| Expenditure deciles     | 10     | 20     | 30     | 40      | 50      | 60      | 70      | 80      | 90      |
|-------------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| Expenditure (Kshs p.m.) | 547.47 | 742.87 | 925.27 | 1114.29 | 1334.79 | 1614.37 | 1956.04 | 2494.76 | 3576.09 |
| Central rural 94        | 0.79   | 0.98   | 1.51   | 2.29    | 3.60    | 5.76    | 9.55    | 16.30   | 33.05   |
| Coast rural 94          | 3.90   | 4.91   | 6.35   | 8.37    | 10.53   | 14.72   | 18.61   | 26.84   | 39.83   |
| Eastern rural 94        | 4.84   | 5.75   | 7.89   | 9.40    | 12.14   | 16.61   | 22.08   | 31.39   | 48.18   |
| Nyanza rural 94         | 2.71   | 3.80   | 5.29   | 7.19    | 9.91    | 13.91   | 19.13   | 26.87   | 44.71   |
| Rift valley rural 94    | 2.93   | 3.94   | 6.01   | 7.64    | 9.83    | 13.37   | 18.61   | 27.22   | 43.19   |
| Western rural 94        | 4.63   | 7.47   | 9.49   | 12.22   | 14.47   | 17.67   | 22.42   | 32.15   | 50.06   |
| Total rural 94          | 3.30   | 4.48   | 6.09   | 7.85    | 10.08   | 13.67   | 18.40   | 26.79   | 43.17   |
| Nairobi                 | 1.63   | 1.63   | 2.03   | 2.03    | 2.85    | 4.07    | 5.69    | 9.35    | 26.02   |
| Central urban 94        | 1.91   | 2.86   | 3.81   | 4.29    | 4.76    | 5.71    | 7.14    | 10.95   | 28.57   |
| Coast urban 94          | 1.63   | 1.63   | 2.03   | 2.03    | 2.85    | 4.07    | 5.69    | 9.35    | 26.02   |
| Eastern urban 94        | 2.65   | 3.30   | 3.41   | 3.79    | 6.00    | 7.20    | 11.36   | 15.91   | 25.38   |
| Nyanza urban 94         | 2.23   | 3.57   | 4.91   | 4.91    | 4.91    | 6.70    | 9.82    | 16.07   | 29.02   |
| Rift valley urban 94    | 0.27   | 0.55   | 0.82   | 1.37    | 1.64    | 3.83    | 5.46    | 11.20   | 26.23   |
| Western urban 94        | 7.29   | 7.29   | 8.33   | 8.33    | 9.38    | 11.46   | 13.54   | 21.88   | 26.04   |
| Total urban 94          | 2.52   | 2.97   | 3.62   | 3.82    | 4.63    | 6.15    | 8.39    | 13.53   | 26.75   |
| Central rural 97        | 0.67   | 1.72   | 3.35   | 6.43    | 10.74   | 16.25   | 23.99   | 36.27   | 55.67   |
| Coast rural 97          | 2.67   | 7.53   | 12.17  | 17.01   | 22.85   | 30.07   | 36.98   | 46.38   | 58.41   |
| Eastern rural 97        | 3.64   | 8.91   | 14.99  | 22.2    | 28.88   | 38.22   | 48.06   | 60.93   | 75.3    |
| Nyanza rural 97         | 4.09   | 9.62   | 16.28  | 24.04   | 33.87   | 42.9    | 54.34   | 66.07   | 80.57   |
| Rift valley rural 97    | 1.96   | 5.25   | 9.18   | 14.3    | 20.81   | 28.17   | 37.93   | 49.31   | 64.99   |
| Western rural 97        | 3.83   | 8.66   | 15.97  | 23.14   | 31.33   | 43.7    | 55.52   | 67.79   | 83.22   |
| Total rural 97          | 2.47   | 6.08   | 10.58  | 16.1    | 22.72   | 30.7    | 40.27   | 52.14   | 68.15   |