INCOME DISTRIBUTION AND POVERTY IN KENYA: A STATISTICAL ANALYSIS

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A B S T R A C T

The paper addresses the relationship between income distribution, regional and sectoral income disparities, and poverty in Kenya.

The data used in the estimation of the degree of income inequality are consistent with the National Accounts and the Population Census; three different household groups are distinguished: urban households, smallholders and other rural families. The within-group income distribution of the two rural household groups are proxied by consumption and land distribution, respectively; while the estimation of the overall income inequality assumes a lognormal distribution pattern.

The result of the analysis suggests that income in Kenya is distributed very inequally, with a Gini-ratio in the neighbourhood of 0.60. Moreover, the sectoral decomposition of the total inequality indicates that dualism within rural Kenya is almost as important as the urban-rural disparity. However, the disaggregation at the provincial level adds very little to the understanding of the source of income inequality, with less than 10 per cent of the variation in income explained by the provincial grouping.

The analysis of poverty finds poverty is a rural as well as an urban phenomenon. However, rural poverty is more striking, both in terms of extent and intensity. Indeed, 33 per cent of all the rural households are affected by poverty and their average income equals only 55 per cent of the poverty-line. For the urban households, the figures are 15 and 65 per cent respectively.

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I. Introduction

The objective of this paper is to assess, in a more or less straightforward way, the degree of income concentration in Kenya at a particular moment in time, and to decompose the inequality index in order to measure the contribution of various sectors or regions to the overall income in equality. In addition, the article gives an estimation of the extent and the intensity of poverty in the country.

It is well known that the conclusions of a study on income distribution are highly sensitive to the definition of income and income unit, to its level of disaggregation and to its method of estimation. Therefore, it is important to state explicity the main characteristics of this study. The methodology used in this article has three main features. First, the data base mainly consists of the national accounts and the population census, whereas other studies have household budget surveys as the sole source of information. Second, the level of disaggregation is determined by the accuracy and availability of the data, this in order to limit the number of assumptions and "guestimates". Indeed, some authors have estimated the income distribution in Kenya from income and population figures of various socio-economic groups. However, they had to estimate the population share and income share for some groups because of lack of data. In the absence of any empirical indicator, it is obvious that these "guestimates" may reflect the presumptions of the researcher and as such bias the final result. Finally, a third feature is that the method allows to incorporate an income distribution system into a general simulation model because of its consistency with the aggregates of the model and its assumption of lognormality.

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* This study was carried out as part of the country case-study on Kenya within the framework of the inter-regional project: "A socio-economic framework for basic needs planning" (ILO/INT/79/07/NETH).

2. Methodology

In general, studies on income distribution are based on the results of household budget surveys and as such suffer from a number of shortcomings, due to sampling and non-sampling errors of the survey. Consequently they may show little relation with the data collected for the national accounts. Indeed, household budget surveys usually collect accurate data on household size and composition, but systematically tend to under-estimate real household income[1].

There are two alternative solutions to this problem of under-estimation. First, one can try to adjust the results of the survey for the discrepancy with the national account figures[2]. This method, however, seems arbitrary since it is theoretically not clear how to devise a reasonable way for adjusting the survey results. This is reflected by the great number of adjustments proposed by numerous authors.

The second solution consists of a method which changes and improves the informative nature of the national accounts by combining it with other relevant data sources. The additional information then consists of the results of demographic surveys, labour-force surveys, family budget surveys and eventually other specific surveys. This solution implicity assumes that the reliability and accuracy are higher for the national accounts data as compared to household budget surveys, since the former are regularly published and reviewed[3]. In the framework of this article, the second solution will be adopted, also because of the recent publication of Kenya's first Social Accounting Matrix (SAM)[4].

The S.A.M. or the extended input-output table is ah alternative presentation of the national accounts data which is more concerned with the distribution of income, consumption and wealth. The conventional double entry national accounts only present aggregates for national income, consumption and production and do not provide an understanding of the interrelationship between these aggregates.

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1 CRAMER, J.S., Empirical econometrics, Amsterdam, North Holland Company, 1971.

2 See, for example, ALTIMIR, O, Income distribution estimates for household surveys and population censuses in Latin America: an assessment of reliability. World Bank, Washington D.C., 1977 (Mimeo).

3 VAN GINNEKEN, W., Generating internationally comparable income distribution data. ILO, Geneva, 1981 (Mimeo).

4 Social Accounting Matrix - 1976. A revised edition. Central Bureau of Statistics (CBS), Nairobi, 1981.

The paper first considers the household as the income unit, i.e. a group of persons eating and living together and operating a common cash account. In a later section we will estimate the income distribution by household member.

Income is defined as total available income of private households. It includes income in cash as well as in kind, the market value of own produced consumption, the imputed rent, the domestic transfers and the transfers with the rest of the world. This definition is the best reflection of the relative welfare position of the household, given the little information we have about the distributive effects of government expenditure. As a result, the distribution considered here is that of secondary income (i.e. income after taxation) and not of tertiary income (i.e. post-tax income adjusted for the benefits from public spending).

The statistical description of the income distribution is known as the law of GIBRAT or the law of the proportional effects[5]. According to the law, income depends upon the product of a series of independent random factors such as intelligence, education, geographical location, sex, risk-aversion, etc. These characteristics are assumed to be normally distributed among the population. However, the multiplicative effect of normally distributed variables leads to a lognormal distribution. In this case, it means that the logarithm of income is normally distributed, instead of a normal distribution of income.

Indeed, empirical research confirms that the lognormal distribution is in accordance with observed income data[6,7]. It gives a good fit in the middle income brackets, covering more than 60 per cent of the population. This makes the lognormal description of the income distribution superior to the Pareto distribution since the latter describes the distribution for the upper income levels only.

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5 KAPETYN, Skew frequency curves in biology and statistics. Noordhoff, Groningen, 1903.

GIBRAT, R, Les inegalites economiques. Paris, Sirey, 1931. Both Publications are quoted in: The lognormal distribution (see 6).

6 AITCHISON, J., and BROWN, J., The lognormal distribution. Cambridge, University Press, 1957.

7 KAKWANI, N.C., Income inequality and poverty. Oxford, University Press, 1980.

Another property is that a distribution is lognormal when the individual components of that distribution are found to be lognormal. Thus, the lognormality of the intra-group income distributions implies a lognormal distribution of total income.

An additional property of the lognormal distribution is its efficient estimation methods, following from its close relationship with the normal distribution.

3. Total disposable household income and its disaggregation

The S.A.M. - 1976 disaggregates total disposable household income into eight categories of households, according to the location and income level or holding size. The classification is shown in table 1. The table shows that for all urban households, poor as well as rich families, wage employment constitutes a major source of income. Capital income (or income from investment) and income from self-employment, however, seem to show a strong positive correlation with the level of income. The balance of the transfer payments (including taxes, remittances and social security payments) are negatively correlated with income, which suggests that the transfers do lower the income inequality.

For smallholders (i.e. rural households with a holding of less than 20 hectares) three quarters of the income consists of income from self-employment. The share of capital income increases as total income rises, ranging from 9 per cent, for the holdings below 0.5 ha. to 23 per cent for the holdings over 8.0 ha. The opposite is true for income from wage employment, with a share of 22 per cent of total income of smallholdings below 0.5 ha. as compared to an only 8 per cent share for the largest holding group. The incidence of transfer payments is less clear since the large smallholders have a zero transfer-balance, whereas all the other smallholders benefit, except the smallest holdings who are net contributors to the transfer system. This suggests that transfers increase the income inequality.

The somewhat unusual income composition of the 'other rural' group reflects its diverse nature. The group is composed of large farmers, gap farmers*, large farm squatters, landless households and pastoralists. The group derives its income mainly from wage employment, although capital income constitutes about the third of total income. Their contribution to the transfer system is larger than the income they derive from self-employment. The in-

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* Gap farms are farms of 20 ha. in size which are located mainly in the former non-scheduled areas.

Table 1 : THE COMPOSITION OF INCOME BY HOUSEHOLD GROUP

Household group / Source of income	URBAN HOUSEHOLDS			RURAL HOUSEHOLDS					TOTAL	Average income composition (percentage)
	poor	middle	rich	holding size 0.5ha.	holding size 1.0ha.	holding size 8.0ha.	holding size 8.0ha.	other rural		
Wage and salaries	95.1	165.7	77.7	10.0	9.5	49.5	1.7	104.9	513.9	52.4
Self-employment	1.9	6.3	34.1	29.9	48.1	224.3	14.0	32.6	391.2	39.9
Investment	-0.7	19.7	58.8	4.2	5.0	18.3	4.8	51.0	157.1	16.0
Domestic transfers	0.5	-22.0	-29.4	-2.0	3.8	6.4	0.0	-34.6	-73.3	-7.5
External transfers	0.9	- 5.0	- 5.4	0.3	0.2	0.5	0.1	0.5	- 7.9	-0.8
TOTAL INCOME AVAILABLE	97.7	164.7	131.8	46.4	66.4	299.0	20.6	154.4	981.0	100.0

Source : Social Accounting Matrix - 1976. C.B.S. Nairobi, 1981.

clusion of these diverse households in one single group is clearly unsatisfactory, but lack of data made a further disaggregation impossible.

Finally, the last column of table 1 shows the percentage composition of total disposable household income for the nation as a whole. This column shows that, at the national level, income from wage employment is almost as important as income from self-employment and capital income taken tegether.

4. The distribution of total household income

The number of households per category, as distinguished in the SAM is not available and has to be estimated. The best estimates are obtained by way of interpolation of the results of the 1969 and 1979 population censuses[8]. However, it is only possible to estimate accurately the number of households for the following three groups : (i) urban households; (ii) rural smallholders and, (iii) other rural households. The income figures of the SAM have to be aggregated accordingly.

Subsequently, the choice of the proxy distribution is in order. The intra-group income concentration is proxied by the following distributions:

(i) the Nairobi Household Budget Survey[9] for the urban household incomes,

(ii) the distribution of household consumption among smallholders[10] and

(iii) the distribution of land [11] for the other rural households.

The first proxy was chosen because the Nairobi Household Budget Survey covered over 50 per cent of the total urban population.

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8 Kenya Population Census, 1969, CBS, Nairobi, 1970
Kenya Population Census, 1979, CBS, Nairobi, (unpublished).

9 Nairobi Household Budget Survey, 1974. CBS, Nairobi (unpublished).

10 Integrated Rural Survey, 1974/75. CBS, Nairobi, 1977.

11 The land concentration ration is obtained from a combination of following data: IRS 2 - 1976/77. CBS, Nairobi (unpublished) for the land distribution among smallholders.

Gap-farm survey, 1979. CBS, Nairobi (unpublished) for the land distribution gap farmers.

A brief review of farming activities, 1976, CBS, Nairobi, for the land distribution among large farmers.

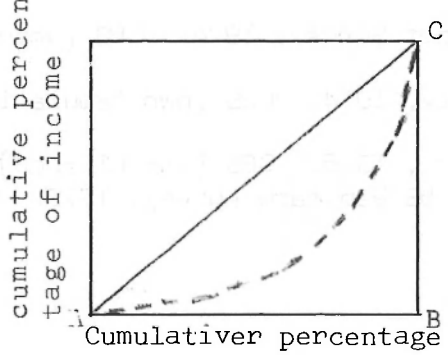
The second proxy, the distribution of consumption among smallholders, is taken from IRS I (1974) since IRS 2 (1976) did not collect data on income and consumption. The income figures reported in IRS I show a large number of households with negative income, but with high levels of consumption. This is because of a negative change in the livestock valuation between the start of the survey and the end.

It is clear that these reporting errors overestimate the true income inequality among smallholders. Therefore, Collier and Lal[12] adjusted the reported income figures (for Nyanza Province only). They exclude the transient changes in the valuation of livestock and replace it by the concept of a permanent livestock income which would leave the value of the herd unchanged. In doing so, their provincial income distribution was 30 per cent more equal than the original reported incomes in the province. However, our approach towards the problem of poor income data of IRS I is different. We consider that total household consumption is the best proxy for permanent or long term household income, because the level of consumption is relatively insensitive to the income variability in the short run. Moreover, the collected consumption data are generally fairly accurate and reliable.

The last proxy, the distribution of land, appears to be very unequal and although land utilization may be negatively correlated with holding size, there is some evidence for its use, since the 'other rural' group in the SAM - classification includes very heterogenous sub-groups, as already referred to. Undoubtedly, the within group inequality will be high. Even so, the proxy distribution is preferable to completely subjective guesswork since no better empirical basis exists to estimate the income of these sub-groups.

The three proxy distributions are described by the decile distribution and by the value of the GINI-ratio (see table 2).

The GINI-ratio is closely related to the Lorenz curve. The curve shows graphically the degree of income dispersion by plotting the cumulative percentage of households (horizontal axis) against the cumulative percentage of income (vertical axis). Figure 1 illustrates the Lorenz curve.



12 COLLIER, P., and LAL, D., Poverty and growth in Kenya. World Bank, Working Paper No. 389, Washington D.C., 1980.

There is perfect equality when x per cent of the population gets the same percentage share of total income. Such a situation is depicted by the diagonal line AC. The other extreme situation is when one household gets the total income, whereas all the other households have zero income. This situation is represented by the line ABC. Obviously, the real situation will be in between these two extremes as depicted by the dotted line.

The value of the GINI-ratio equals the quotient of the area enclosed by the Lorenz curve and the diagonal line by the total area under the diagonal line. Consequently, the ratio is zero for a completely equal distribution and equals unity for an extreme unequal distribution. Thus the higher the GINI-ratio, the more unequal the distribution.

Referring to table 2 below, one observes that urban income inequality is larger than the income inequality among smallholders, but is smaller than the inequality within the other rural group as proxied by the land distribution. The table shows that only 10 per cent of the large farmers occupy 73 per cent of the total acreage.

Table 2: THE DECILE DISTRIBUTION OF THE PROXY DISTRIBUTIONS

Decile	Urban Households (1)	Smallholders' consumption distribution (2)	Land distribution (3)
bottom	1.33	2.22	0.00
2nd	2.42	3.53	0.66
3rd	3.13	4.80	0.98
4th	3.72	6.06	1.18
5th	4.97	7.28	2.17
6th	6.09	8.63	2.55
7th	7.84	10.73	4.35
8th	12.94	12.54	5.48
9th	16.86	15.62	9.65
top	40.70	28.59	72.98
Gini-ratio	0.5179	0.3818	0.8066

Source: (1) Nairobi Household Budget Survey, 1974. CBS (unpublished)

(2) Integrated Rural Survey, 1974. CBS (own tabulation)

(3) Integrated Rural Survey, 1976. CBS (unpublished). A brief review of farming activities, 1976. CBS Gap farm survey, 1979. CBS (unpublished).

The next step in our analysis of the income distribution consists of the test for lognormality of the proxy distributions. This is done by plotting the income shares of the deciles as reported in table 2, on a lognormal probability chart and by fitting a linear curve on these values. The income shares estimated from this linear curve correlate very well with the values given in the previous table. The coefficient of correlation between the two series of income shares is very close to one for each group of household, with respective values of 0.996, 0.912 and 1.000. This indicates that the proxy distributions do follow a lognormal pattern.

Subsequently, the log-variance of the within group income distribution is derived from the value of the GINI-ratio of the corresponding proxy distribution by the following formula[6]

σδδ

$$G = 2\ P\left[\bar{X} < \frac{\delta}{\sqrt{2}}\right]$$

where: G: Gini-ratio
P: probability
X: a normally distributed variable.
δ: the log-variance

With the knowledge of the moments of the lognormal distribution we know all the elements required to calculate the national income distribution. Table 3 contains some of these elements while the remaining ones are given in footnote[13].

The nationwide Gini-ratio derived from the total variance of the lognormal distribution which is composed of the within-group and the between-group variance, equals 0.5990.

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13. The moments of the lognormal distribution are:

- mean $a = e^{u + \frac{1}{2}\delta^2}$
- median $= e^{u}$
- mode $= e^{u-\delta^2}$
- variance $V^2 = e^{2u+\delta^2}(e^{\delta^2} - 1)$
- within-group variance $(V_I^2) = \Sigma \frac{M_i V_i^2}{N}$
- Between-group variance $(V_E^2) = \Sigma_i \frac{N_i(a_i-a)^2}{N}$

with $V = \sqrt{V_I^2 + V_E^2}$

N = number of households in group i
a = national mean income

- coefficient of variation $n = \frac{V}{a} = \sqrt{e^{\delta^2} - 1}$
- quantiles of the lognormal distribution : $\xi_q = e^{u + \upsilon_q \delta}$ with υ_q : quantile of order q of N (o,1)

ξ_q : quantile of order q of $\Lambda(u,\delta^2)$

The variance of the overall lognormal distribution is the sun of the within-group variance and the between-group variance. The former is the weighted average of the log-variances of the proxy distributions while the latter is the weighted variance of the mean group incomes. In both cases, the weights are equal to the population shares.

However, at this stage, the Gini-ratio may not give a completely accurate picture since it includes the weighted average of the unduly high ratio for the 'other rural' group. Therefore an adjustment is required.

It is generally, acknowledged that the concentration of land is higher than the concentration of both income and consumption. However, there ia no concensus on the extent of disparity between the concentration ratios, since this is largely determined by country-specific realities (e.g. the tenure system, the importance of the agricultural sector, the tax system, the wage policy, etc.).

In the case of Kenya, however, there is an indicator for the disparity between the concentration ratio of land and income. From the IRS I data, we know that the land Gini-ratio equals 0.4552 while the income concentration ratio (as proxied by consumption) is equal to 0.3818. If one assumes that in the Kenyan context the discrepancy between both Gini-ratios has the same magnitude for 'other rural' households as for smallholders, it becomes possible to estimate the income inequality among the 'other rural' households. Thus according to the above, the Gini-ratio of the third proxy distribution has been reduced by 16 per cent.

Table 3 contains the main elements to compute the national income concentration index.

This adjustment yields a national Gini-ratio of 0.5855 which is only 2 per cent below the estimate of the unadjusted ratio. Consequently, the inequality measure appears to be relatively stable and the somewhat crude adjustment method has little impact on the overall inequality.

The sensitivity test confirms that household income in Kenya is very unequally distributed, with a Gini-ratio in the neighbourhood of 0.60. The corresponding decile distribution, derived from the lognormal distribution, is presented in table 4.

Table 3 : SOME COMPONENTS OF THE HOUSEHOLD INCOME DISTRIBUTION

Variable	Urban Households	Smallholders	Other Rural	TOTAL
Number of households	433,299	1,707,791	462,988	2,604,078
Share in total number (%)	16.64	65.58	17.78	100.00
Mean household income (Shs. a year)	18.195	5,064	6.670	7,534
Intra-group Gini-ratio	0.5179	0.3818	0.6775	-

Source : SAM, Population Census, IRS, Nairobi HBS, Large and Gap farm surveys.

Table 4 : THE ESTIMATED NATIONAL HOUSEHOLD INCOME DISTRIBUTION

Decile	Income share
bottom —	0.87
2nd	1.75
3rd	2.63
4th	3.66
5th	4.94
6th	6.57
7th	8.89
8th	10.27
9th	14.60
top	45.82
Gini-ratio	0.5855

5. The income distribution per household member

The Nairobi Household Budget Survey as well as the Integrated Rural Survey collected data on the household size by income level. Both surveys suggest that the two variables are positively correlated so that the income distribution per household member will be more equal than the household income distribution. Of course, this supposes a perfect income sharing with-

in the household.

Unfortunately, the relationship between household size and income level for the 'other rural' group of households is unknown. Hence, it has been assumed that the same relationship applies as for the smallholders' group. The income inequality index for the urban population is derived from Collier and Lal while the income Gini-ratio for the rural population has been calculated from the original IRS 1 data. Table 5 contains the results of these computations.

Table 5 : THE ELEMENTS OF THE DISTRIBUTION BY HOUSEHOLD MEMBER

Variable	Urban Population	Small-holders	Other Rural	TOTAL
Average house hold size	4,35	5.10	7.04	5.32
Total population	1,884,851	8,709,734	3,258,887	13,853,472
Share in total population (%)	13.61	62.87	23.52	100.00
Average income per household member (K.Shs. per year)	4,183	993	948	1,416
Intra group Gini-ratio	0.4517	0.3536	0.6275	—

Source : SAM, Population Census, IRS, Nairobi HBS, Large and Gap farm surveys.

For household members, the national Gini-ratio is 0.5867 which is 2 per cent higher than the household income inequality index. Thus, the effect of the positive correlation between household size and the level of household income has been offset by a greater income disparity between the groups distinguished. Indeed, the relatively better-off urban households tend to be

smaller than the poorer rural households, so that the urban-rural income disparity by household member is greater than for households. This implies that the lower within group inequality has been replaced by a higher between-group inequality.

6. The decomposition analysis

In this section we will estimate the contribution of the urban and rural sectors to the nationwide income inequality. In addition, we will estimate the importance of the provincial dimension in the explanation of the rural inequality. The analysis uses Mangahas' decomposition formula[14], specified below:

$$G = \sum_{j} \frac{f_j m_j}{m} G_j + \sum_{i>j} \frac{f_i f_j D_{ij}}{m}$$

where: f_j : the proportion of total population in group j.

m : the average income

G_j : the income Gini-ratio within group j.

D_{ij} : the Gini-difference between group i and j.

The overall income inequality is considered as a weighted average of the within-group Gini-ratios (with weights equal to the proportion of total income accruing to the various income groups) plus the weighted sum of all possible Gini-differences. The first term on the right-hand side measures the within-group inequalities whereas the contribution of the between-group inequalies is measured by the second term. The result of the decomposition analysis is presented in figure 2. The figure reads as follows: 36 per cent of the national inequality is due to the inequality among the urban households. The inequality in rural households contributes more than half to the nationwide inequality and the disparity between the average urban and rural households adds 11 per cent to the national Gini-ratio. The latter is in accordance with Fields'[15] conclusion

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14. MANGAHAS, M. Income inequality in the Philippines: a decomposition analysis, ILO/WEP, Working Paper No.12, Geneva, 1975.

The choice of the formula for the sectoral decomposition is not crucial here, since all decomposition techniques appear to give satisfactory and comparable results (see FIELDS 15).

15. Fields, G.S., Decomposing LDC inequality. In Oxford Economic papers Volume 31 (1979), No. 3 (November) pp. 437 - 459.

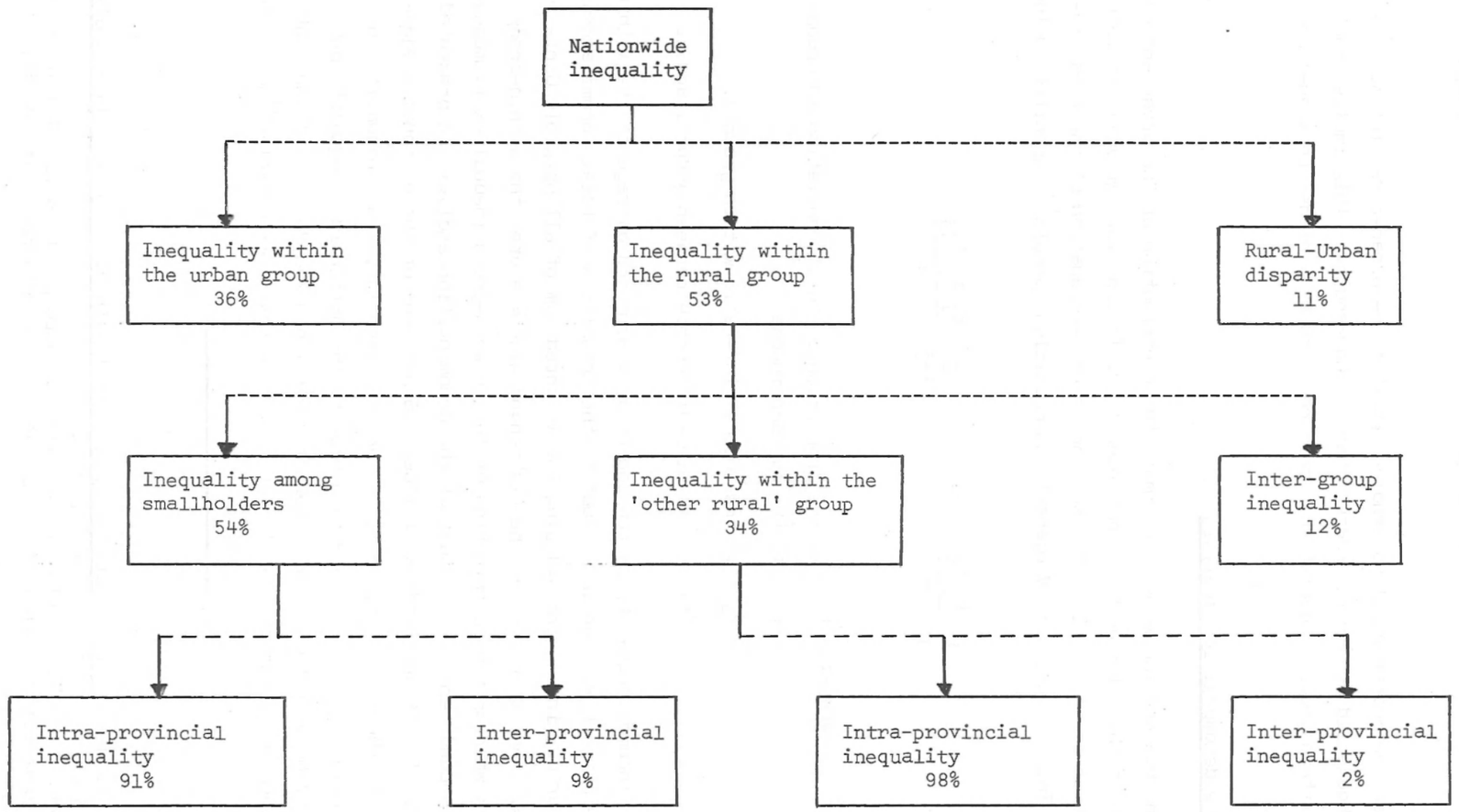

Figure 2 : The decomposition of income inequality

that on the average, the sectoral dimension in developing countries explains only 10 per cent of the overall inequality.

Figure 2 indicates also that dualism within the rural sector in Kenya is as important as dualism between the rural and urban areas.

However, this conclusion should be arrived at with caution because the disaggregation of the rural households is so crude.

Finally, the disaggregation at the provincial level adds very little to the understanding of the structure of income inequality, which confirms the findings of other studies that the inter-regional disparities are relatively unimportant in Kenya.

Indeed, Crawford and Thorbecke [16] conclude that only 4 per cent of the variation in food consumption per household is explained by the provincial grouping. Collier and Lal note that only 4 per cent of the variance in smallholders' income is explained by inter-regional differences. Figure 2 shows that 9 per cent of the variation in smallholders' consumption and only 2 per cent in the farmers holding size are explained by the provincial differences.

7. The extent of poverty in Kenya

The estimation of the extent of poverty depends heavily on the definition of the poverty line. In this section we will estimate a poverty line which is largely based on the definition of poverty by Crawford and Thorbecke[17]. Then, we will compare the results with those of two other studies 12, 17 in order to assess the sensitivity of the extent of poverty with respect to the definition of the poverty line.

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16 CRAWFORD, E., and THORBECKE, E., The analysis of food poverty: an illustration from Kenya. Ithaca, Cornell University, 1979, (Mimeo).

17 CRAWFORD, E. and THORBECKE, E. Employment, income distribution, poverty alleviation and basic needs in Kenya. Ithaca, Cornell University, 1978.

Thorbecke and Crawford use the 'dominant item' approach to define the poverty line and consider food consumption as the single most important commodity. They start from a daily per capita required caloric intake of 2,250 cal. and suppose that the diet is composed of a maize-beans diet in a 70/30 percentage proportion. Then, the required intake is valued at current market prices and the household food-poverty line is obtained by multiplying this value by the average household size. Finally, they divide the household food poverty line by the share of food expenditure in total household consumption to arrive at the household poverty line.

However, as Van der Hoeven already pointed out[18], this last step leads to inaccurate results because the relationship between food consumption and total expenditure (or income) is not linear but curvelinear, as shown in figure 3. Indeed, according to Engel's law, the income elasticity of food consumption is less than unity so that the food Engel curve does follow a logarithmic curve pattern. If one considers the share of food consumption in total expenditure as fixed (OF/OA), then one assumes linearity between food consumption and total household expenditure.

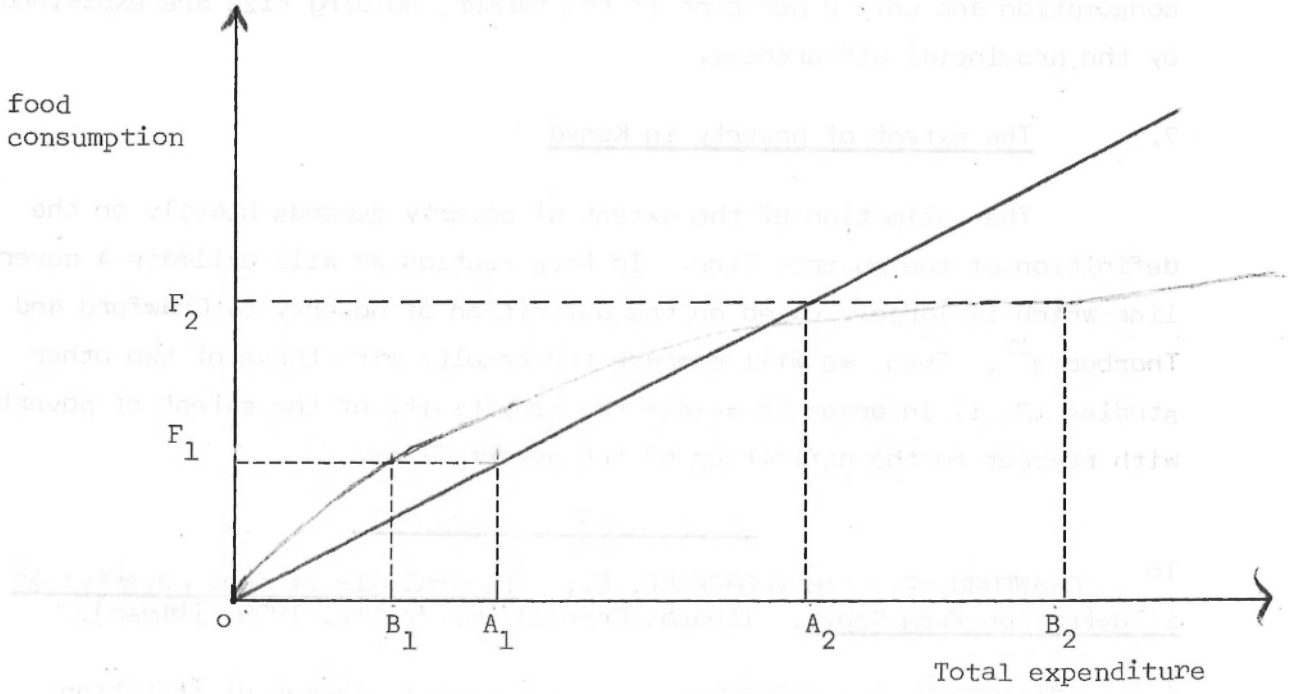

Figure 3: The relationship between food consumption and total expenditure per household.

18 VAN DER HOEVEN, R., Target setting of basic needs with special reference to Africa. ILO/JASPA, Addis Ababa, 1977.

The incidence of the use of the alternative food Engel curves (linear or logarithmic) on the determination of the poverty line depends on whether the food poverty line (vertical axis) lies below or above the intersection level of the linear and logarithmic curves. If the food poverty line is below this intersection, e.g. F_1; the linear curve will over-estimate the poverty line by (B_1A_1). On the contrary, if the food poverty line is above the intersection level, F_2, the linearity assumption will under-estimate the poverty line by (A_2B_2).

Consequently, we estimate a double logarithmic food Engel curve of the following type:

$$\ln\left(\frac{F}{N}\right) = a + b \ln\left(\frac{C}{N}\right)$$

where: F : household food consumption

C : total household expenditure

N : household size.

We take total expenditure as a proxy for household income since surveys systematically tend to under-estimate household income, especially for poor households where temporary fluctuations in income are important. Therefore, total expenditure is considered to be a better proxy for permanent income.

The food Engel curve is restricted by the assumption that food consumption is a linearly homogenous function of household income and household size. This hypothesis cannot be rejected since the elasticity of food consumption with respect to family size appeared not to be significantly different from unity and thus exclude economies or diseconomies of scale.

The Engel curves for rural and urban households are derived from IRS 1 (1974) and from the Nairobi HBS (1974) respectively. The results are shown below:

$$\text{Rural}: \quad \ln\left(\frac{F}{N}\right) = \underset{(68.418)}{-0.193 + 0.996 \ln\frac{C}{N}} \qquad R^2 = 0.998$$

$$\text{Urban}: \quad \ln\left(\frac{F}{N}\right) = \underset{(12.403)}{1.863 + 0.643 \ln\frac{C}{N}} \qquad R^2 = 0.963$$

The income elasticities of food consumption (the slope coefficients) are less than unity and are significantly different from zero (t. values in parentheses). Even so, the elsticity is higher for rural households than for urban families, which is in accordance with the general expectation.

In table 6 we regroup all the elements necessary in the calculation of the poverty line. Here, it should be noticed that the effect of the estimation of a rather conservative food poverty line (a maize-bean diet), is partly offset by the fact that the average size of poor households is below the national average size, the latter being used in the determination of the household poverty.

Table 6 : THE DETERMINATION OF THE HOUSEHOLD POVERTY LINE

Location	Per capita food poverty line (1976 K.Shs. p.a.)	Average household size	Share of food consumption in total expenditure	Thorbecke poverty line	Our estimation of the poverty line
Rural	332	5.50	0.78	2,342	2,269
Urban	511	4.35	0.41	5,422	3,936

Source : Thorbecke and Crawford, op. cit. and own estimations.

The results for rural households compare very well with a difference of only 3 per cent. The poverty lines for urban households, however, are significantly different. This is due to the very low share of food consumption in the urban expenditure pattern adopted by Thorbecke and Crawford, (41% only). Their linear curve in figure 3 is very flat and stays under the double logarithmic Engel curve. According to what has been said earlier, this means that their poverty line is over-estimated.

Estimates of the extent and intensity of poverty based on the use of the two poverty lines are summarised in table 7.

Table 7: THE EXTENT AND INTENSITY OF POVERTY, USING DIFFERENT POVERTY LINES

Variable	Thorbecke and Crawford poverty line	Own estimated poverty line
Rural poverty line (K.shs. p.a.)	2,342	2,269
Rural extent of poverty (%)	34.2	33.1
Rural poverty gap (%)	6.1	5.7
Urban poverty line (K.shs. p.a.)	5,422	3,935
Urban extent of poverty (%)	24.5	15.3
Urban poverty gap (%)	2.7	1.1
Total extent of poverty (%)	32.6	30.1
Total poverty gap (%)	4.8	3.9

The extent of poverty is expressed as a percentage of the respective total number of households (rural-urban) while the poverty gap (or intensity) is defined as the shortfall of income of the poor households in respect to the poverty level. The estimated shortfall is expressed as a percentage of total disposable household income in urban and rural areas respectively.

The results in table 7 confirms that poverty in rural areas is of a very large extent, with approximately one rural household in three living in poverty. Collier and Lal also conclude that in 1974, some 34 per cent of the rural households were affected by poverty (they consider a poverty line of 2,000 shs. per annum).

However, this consensus does not exist for the urban poverty estimates. The use of the Thorbecke poverty line results in an extent of urban poverty of 24 per cent while Collier and Lal conclude that less than 3 per cent of the urban population is poor (using a per capita poverty line of 1,000 shs.) The latter would mean that urban poverty in Kenya is nearly non-existant, which is not verified here although we used a significantly lower poverty line. As already argued, Thorbecke's estimate exaggerates the extent of poverty since the poverty line is estimated too high.

The conclusion of this section is that poverty in Kenya is an urban as well as a rural phenomenon. However, rural poverty is more striking both in terms of extent and intensity. Indeed, we find that the average income of poor households equals 65 per cent of the poverty level in urban areas, against 55 per cent only in rural areas.

8. Conclusion

The objective of this article is to assess the degree of income inequality and the extent of poverty in Kenya, using 1976 data.

The data base consists mainly of the national accounts and the population census. The data are disaggregated for these broad groups of household: urban families, smallholders and other rural households. For each of these groups, a proxy distribution is chosen which is likely to reflect accurately the true intra-group income distribution. Furthermore, these income distributions are assumed to be lognormally shaped, according to the law of Gibrat.

This methodology results in a high income inequality index (Gini-ratio = 0.59), ranking Kenya very high in a cross-country classification according to different levels of income inequality and per capita income level[19]. Indeed, the lowest 40 per cent of the population receives only 9 per cent of the national income, whereas 60 per cent of the income accrues to the top 20 per cent of the population. This magnitude of income inequality is found to be similar in all provinces and sectors. However, within the rural sector it appears that the inequality among smallholders is significantly lower than among the other rural households, including large farmers, gap farmers, landless persons and pastoralists.

The high degree of income concentration given Kenya's level of G.D.P. per capita is one of the single most important factors in the explanation of the large extent of poverty in the country. Rural poverty is most important in terms of both extent and intensity with rural households accounting for about 90 per cent of all poor households.

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19 CHENERY, H., et al. Redistribution with growth. Oxford, University Press, 1974, Table 1. pp. 8-9.

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