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DETERMINANTS OF INCOME INEQUALITY AMONG RURAL HOUSEHOLDS OF IBADAN, OYO STATE, NIGERIA

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ABSTRACT

Researches in the last two to three decades in Nigeria point to the fact that the citizens are still embroiled in poverty despite the huge resources that had been committed to poverty alleviation programmes. Absence of articulated policy on income distribution had prevented the 'trickling down' of the beneficial effects of the little growth achieved over the years. This study focused on the analysis of the determinants of income inequality in rural households of Ibadan, Oyo State. Primary data was collected from 120 rural households in two local governments using questionnaire and employing a 3-stage sampling procedure. Gini coefficient was used as a measure of inequality. In addition, Shapley approach was used in decomposing the inequality index in a regression-based context to determine the contribution of the various factors. Results show that there was high inequality in the income distribution of the rural households, which was reflected in the 0.5499 Gini coefficient value. The results further reveal that education was the only inequality-decreasing factor with household size contributing most (29.8%) to increasing inequality. Marital status, land size and agricultural credit also had inequality-increasing effects with the magnitude of marital status (26.0%) being close to that of household size. Government should therefore enhance the inequality-decreasing effects of education by investing more in human capital development of the rural households.

Key words: Income inequality, Shapley, rural households, capital.

INTRODUCTION

Inequality is a logical outcome of the market economy which is made up of structures and institutions all of which are the main venues of socio-economic integration. Inequality could arise from unequal ownership of the means of production (land and capital) and unequal access to economic and social goods and services (Awoyemi, 2004). The effects of economic inequality have received a good deal of attention from development economists and macroeconomists in recent years. This is a result of the rise in inequality between and within countries, evident since at least 1980s. Economists have been concerned with understanding the implications for development and growth (Seguino, 2005). Martins (2005) also observed that in the last twenty years, the unequal distribution of income (measured in Gini coefficients) within many countries has grown worse. Out of the 73 countries for which figures were available, 53 (comprising over 80% of the

world's population) have recorded an increase in inequality of income distribution. It is only in nine (9) countries (comprising about 4% of the world's population) that the wealth gap between the rich and the poor have been reduced. Even in countries with high economic growth rates, social disparities remain large.

An overview of the researches conducted in the last two decades reveals a high incidence of poverty and inequality in Nigeria. Canagarajah *et al* (1997) reported an increase in the Gini coefficient from 38.1% in 1985 to 44.9% in 1992. Also, Aigbokhan (1997) reported a Gini coefficient of 0.510 for rural households in his 1991 household survey of Western Nigeria. Similarly, a deepening inequality from 0.394 to 0.520 was reported for urban households between 1983/84 and 1991 and a deepening rural inequality from 0.389 to 0.510 for the same period. The World Bank (1996) estimation showed similar case of deepening inequality, the Gini coefficient rose from 0.387 in

1985 to 0.499 in 1992. Oyekale *et al* (2006) observe that income inequality worsened between 1998 and 2004 in most of the states in Nigeria and this increased poverty incidence and depth. Gini inequality index for the total income was 0.5802, which shows that income inequality was high in Nigeria with the Gini inequality index of total income being higher in rural areas (0.5808) than urban areas (0.5278).

In recent times, just like in the past, much has been expended on poverty alleviation. However, in spite of these huge resources committed, it is obvious that the impact is little and the masses are still not better off. The achievement has been in the area of growth with little or no achievement in the area of distribution. One of the factors hindering the success of government in its effort to reduce the level of poverty is the ineffective targeting of the poor (Omonona, 2001) and lack of articulated policy on income distribution (Nemedia, 2004). Strong link has been found among poverty, inequality and economic growth. This is evident from the works of several researchers (Okunmadewa, 1997; Awoyemi *et al*, 2004). Widening income inequality has contributed significantly to the increase in poverty in Nigeria. Economic growth has tended to benefit people who work in public sector management and fiscal policies have not promoted income redistribution (NNPC, 2004). In actual sense, discussions on poverty alleviation have been tailored along income growth neglecting the role of income redistribution. However, Oyekale *et al* (2006) found that income redistribution is an important contribution to poverty change in Nigeria. It is therefore necessary to tackle the redistribution problem by knowing the factors that determine income inequality (and also measure inequality) in order to put an effective and lasting policy in place so as to combat poverty and other vices associated with income inequality.

The general objective is to assess the predisposing factors of income inequality in the study area. Specific objectives include the following:

- identify the socio-economic characteristics of the respondents
- measure the level of income inequality in the study area
- determine factors that explain income level of respondents
- assess the quantitative contribution of each of the factors to overall income inequality
- make policy recommendations based on the findings

METHODOLOGY

Conventional approaches to income decomposition typically follow Shorrocks (1980, 1982, 1984) and Bourguignon (1979). Under these frameworks, decomposition can be carried out either by population sub-groups or by factor components. Both produce 'within' and 'between' components (Wan and Zhou, 2004). Decomposition by factor components (or income sources) was employed by Adams, Jnr (2001), Awoyemi and Adeoti (2004), Omonona (2006) and Oyekale *et al* (2006) through source decomposition of Gini coefficient. The shortcoming presented by factor components is that it does not allow the decomposition of total inequality into components associated with each of the fundamental determinants because it only allows attributing total inequality to the income sources. The new regression-based decomposition approach allows the quantification of the contribution of each factor of inequality while controlling for the effects of others. However, in spite of the potential advantages of regression-based approach to inequality decomposition, there are several other limitations. These include large error term, its non-

contribution towards overall inequality and absence of account for the contribution of constant term to total inequality (Gunatilaka and Chotikapanich, 2006). The Shapley value decomposition however, circumvents the problem of a large residual and decomposes inequality completely into its contributory factors as it accounts for all parts of the income generating equation (Shorrocks, 1999 in Gunatilaka and Chotikapanich, 2006). Also, Gunatilaka and Chotikapanich (2006) observed that starting with an income-generating function, the method can be used to decompose any inequality index using an income-generating model of any functional form. It also has the advantage of eliminating the ‘black box’ that remained unexplained in many conventional decomposition techniques.

Awoyemi and Adeoti (2004) carried out work on rural Nigeria decomposing income inequality by sources of income. Standard Gini decomposition was however applied on a nationally representative data. Also, Oyekale *et al* (2006) used a nationally representative data to examine the measurement and sources of income inequality in rural and urban Nigeria but using Shapley Approach for poverty decomposition only. This work thus seeks to employ regression-based decomposition using Shapley Approach to inequality decomposition with its attendant advantages to analyse income data collected from rural households of Ibadan.

Data source and collection

The study area comprises the rural areas of Ibadan. Ibadan is one of the rainforest cities located in the Southwestern part of Nigeria. It is the capital city of Oyo State. It consists of eleven (11) local governments. Data used for this study was collected from rural households in Ibadan. A 3-stage sampling procedure was used because of the complex, rural-urban-mix nature of Ibadan. Firstly, all the local governments areas were grouped into

two (rural and urban strata) based on the level of infrastructural development. At the second stage, two (2) local governments were randomly selected out of the six (6) local governments that represent the rural stratum. The two local governments were thereafter dichotomised to the peri-urban and core-rural. This was done mainly based on the population of inhabitants. One hundred and twenty (120) questionnaires containing structured and unstructured questions were then administered to randomly-selected households in the settlement groups proportionate to the size of each location. Interview sessions were also conducted in addition to the questionnaires distributed.

Analytical Technique

Descriptive statistics was used to analyse socioeconomic characteristics of the household. Gini coefficient was used to measure the level of income inequality because it satisfies the four highly desirable properties of anonymity, scale independence, population independence and transfer principles. Shapley approach to decomposition was used to decompose the income inequality to its components after the initial regression analysis.

Regression Analysis

The following model specification was employed,

$$\ln Y_i = \alpha + \sum_k \beta_k X_{ik} + \varepsilon \dots(1)$$

where Y_i = income (earnings) of individual i
 X_{ik} = kth explanatory variable of individual i
 α = constant term

β_k = coefficient of kth explanatory variable

ε =error term

The equation is given by,

$$\ln Y_i = f(X_1, X_2, X_3, \dots X_n) \dots(2)$$

$$\ln Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots \beta_{16} X_{16} \dots(3)$$

The use of semi-log specification is prompted by the finding that the income variable can be approximated well by a lognormal distribution (Shorrocks and Wan, 2004b in Wan and Zhou, 2004).

The *dependent variable* is the natural log of per capita household annual income. The total income of each household head includes: employee income; income from self-employment; income less expenses from rentals, except rent of land; property income and current transfer received. This list is based on the income concept recommended by the Canberra Group for International comparisons of Income Distribution. The *explanatory variables* are:

X_1 = Location dummy (D=1 if core-rural, 0 if peri-urban)

X_2 = Sex of household head dummy (D=1 if male, 0 if female)

X_3 = Age of household head in years

X_4 = Marital status of head (D=1 if married, 0 otherwise)

X_5 = Household size

X_6 = Education of head (D=1 if formal, 0 if non-formal)

X_7 = Primary occupation of head (D=1 if farming, 0 otherwise)

X_8 = Experience (measured as the number of years the head has spent in primary occupation)

X_9 = Membership of social organisation (D=1 if yes, 0 if no)

X_{10} = Land size in hectares

X_{11} = Farm distance in kilometres

X_{12} = Agricultural credit in Naira

X_{13} = Market distance in kilometres

X_{14} = Access to extension service (D=1 if yes, 0 if no)

X_{15} = Access to fertiliser (D=1 if yes, 0 if no)

X_{16} = Access to electricity (D=1 if yes, 0 if no)

Stepwise deletion was carried out to eliminate least significant variables at each stage of the regression. Six (6) variables were finally left on which Shapley decomposition was carried out.

Shapley Value Decomposition

According to exposition made in Gunatilaka and Chotikapanich (2006), the decomposition begins by estimating an income-generating model (in this case with six explanatory variables). The variables are:

MART = Marital status (D=1 if married, 0 otherwise)

HHS = Household size

EDU = Education of household head (D=1 if formal, 0 if non-formal)

LND = Land size in hectares

DST = Farm distance in kilometres

CRD = Agricultural credit in Naira

$$\ln Y_i = \alpha + \beta_1 MART_{1i} + \beta_2 HHS_{2i} + \beta_3 EDU_{3i} + \beta_4 LND_{4i} + \beta_5 DST_{5i} + \beta_6 CRD_{6i} + \varepsilon \dots(4)$$

The results of the regression was used to obtain predicted income as follows,

$$\ln \hat{Y}_i = \hat{\alpha} + \hat{\beta}_1 MART_{1i} + \hat{\beta}_2 HHS_{2i} + \hat{\beta}_3 EDU_{3i} + \hat{\beta}_4 LND_{4i} + \hat{\beta}_5 DST_{5i} + \hat{\beta}_6 CRD_{6i} \dots(5)$$

$\ln \hat{Y}_i$ was then used to calculate \hat{G}_{TOT} , which is the total income inequality as calculated by the Gini index, in turn determined by the distribution of incomes attributable to X_1, X_2, \dots, X_k i.e the explanatory variables.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

The distribution of the household heads based on the socio-economic characteristics is presented in Table 1. The result shows that male-headed households (90.8%) and the households headed by the married (88.3%) were in the majority. From the table, majority of the respondents (52.5%) were between the ages of 41 and 60, 26.7% were in the age bracket 21-40 years while 20.8% were over 60

years of age. The average age was 49 years. Majority of the household had between 5 and 10 members. The average household size was 6 persons. Ninety-one (91) out of the one hundred and twenty (120) respondents, representing 75.8%, had formal education while the remaining twenty-nine (29), representing 24.2% had non-formal education. Further breakdown shows that the majority (35.0%), attended tertiary institutions ranging from colleges of education and polytechnics to universities.

Moreover, the table shows that 53.3% of the respondents had farming as their primary occupation, 14.2% were engaged in trading while 10.8% were artisans. Also, 13.3% were in skilled employment under the government while 7.5% were involved in private skilled employment. The table reveals that majority of the household heads were engaged in farming as their primary source of livelihood. In addition, 73.3% of the household heads belonged to a social organisation ranging from cooperatives and occupational social groups to farmers' union. Moreover, 32.5% of the respondents had farmland of less than 0.05 hectares in size, 43.3% had land holding between 0.05 and 0.10 hectares while only 4.2% possessed land above 0.10 hectares. Twenty percent (20%) of the household heads possessed no land. The result indicates that the farmers in the study area were subsistence (small-scale) farmers with an average of 0.06 hectares land holding.

A further look at the table shows that 2.5% of the respondents in the study area got up to ₦5,000:00 as agricultural credit, 11.7% got between ₦5,000 and ₦20,000 and 14.1% secured between ₦20,000 and ₦50,000. Also, 11.7% were in the ₦50,000 to ₦100,000 category while 40.8% did not get anything. This 40.8% of total represents approximately 52.1% of the total farming households, that is, those that are engaged in

farming either as primary or secondary occupation. It therefore means that majority of the farming respondents did not secure agricultural credit. The average amount was ₦22,119:79.

Table 1: Distribution of heads by socio-economic characteristics

Socio-economic characteristic(s)	Frequency	Percentage
Sex		
Male	109	90.8
Female	11	9.2
Marital Status		
Single	9	7.5
Married	106	88.3
Separated	1	0.8
Divorced	2	1.7
Widowed	2	1.7
Age		
Average= 49 yrs		
21 – 40	32	26.7
41 – 60	63	52.5
> 60	25	20.8
Household size		
Average = 6		
< 5	35	29
5 – 10	67	56
> 10	18	15
Education type		
Primary	13	10.8
Secondary	24	20.0
Modern school	7	5.8
Grade 2	5	4.2
Tertiary	42	35
Non-formal	29	24.2
Primary occupation		
Farming	64	53.3
Trading	17	14.2
Artisanship & Crafts	13	10.8
Government skilled employment	16	13.3
Private skilled employment	9	7.5
(Missing case)	1	0.8
Membership of social organisations		
Yes	88	73.3
No	32	26.7
Size of agricultural land (Average 0.06ha)		
< 0.05	39	32.5
0.05 – 0.10	52	43.3

> 0.10	5	4.2
None ¹	24	20.0
Agric. credit		
(Average= ₦22,119.79)		
0	49	40.8
5000 or less	3	2.5
5,001 – 20,000	14	11.7
20,001 – 50,000	17	14.1
50,001 – 100,000	14	11.7
Missing cases	23	19.2

Source: Field Survey 2007

Size distribution of income

Quintile distribution

The distribution of income based on quintile (shown in Table 2) presents an interesting pattern. The bottom 20% of the household head population received 2.8% of the total income while the top 20% received 58%. The top 40% received 80.2% of the total income with the bottom 40% receiving only 9.3%. Furthermore, the bottom 60% of the population received only 19.8% of total per capital household income compared to the top 20%, which received 58.0% and the top 40% that received 80.2%. This is a highly unequal income distribution.

Table 2: Income distribution based on quintile

Quintile	Mean	% share in total income
First	5,288.15	2.8
Second	12,416.53	6.5
Third	20,176.53	10.5
Fourth	42,746.14	22.2
Fifth	111,900.91	58.0

Source: Field Survey 2007

Kuznet's ratio

Kuznet's ratio is another measure used to show the extent of inequality in income distribution of a population. The Kuznet ratio is the ratio of income

received by the top 20% to that received by the bottom 40%. For this study, the value of the ratio is shown below,

$$\text{Kuznet's ratio} = \frac{58}{2.8 + 6.5} = \frac{58}{9.3} = 6.32$$

The value is large suggesting high inequality.

Lorenz Curve

The Lorenz curve plots the cumulative share of total income against the cumulative proportion of income receiving units.

¹This value should have been 23 to correspond with the associated number of respondents (missing cases) under agricultural credit. However, one of the respondents did not give value for land size.

Table 3: Data for the Lorenz curve

Cumulative % of income recipients	10	20	30	40	50	60	70	80	90	100
Cumulative % of income	0.9	2.8	5.5	9.3	13.8	19.8	29.3	42.0	58.3	100.0

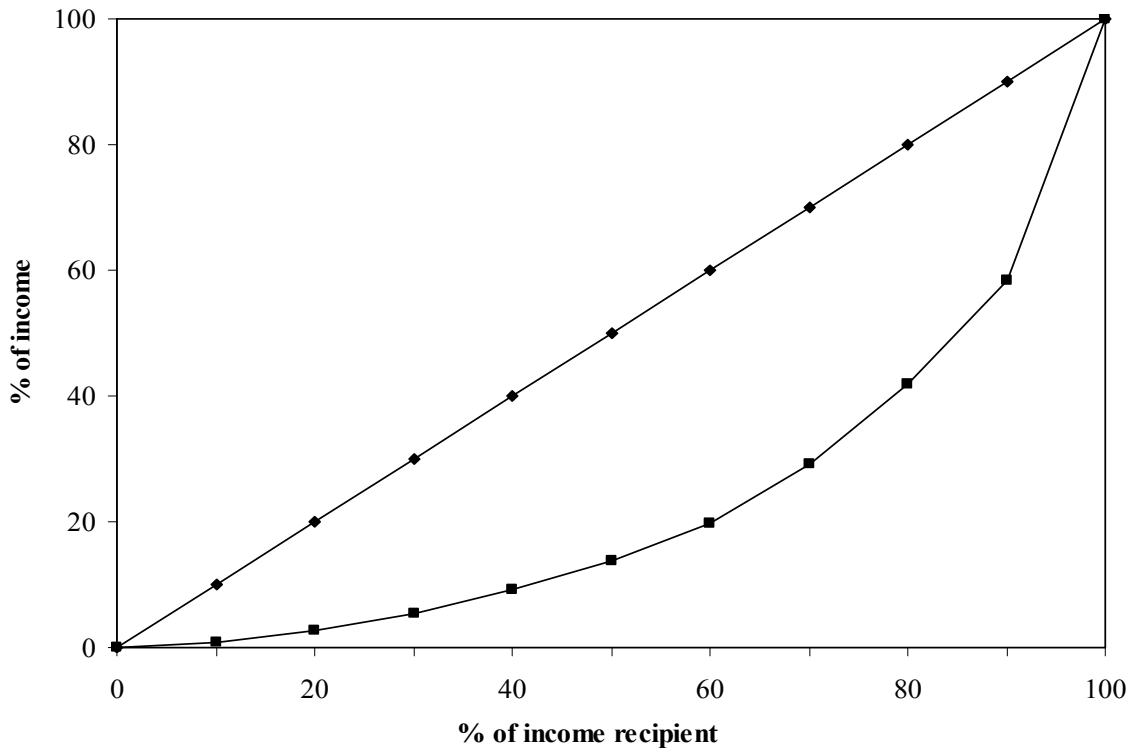


Figure I: Lorenz curve depicting the extent of income inequality

Note: The Gini coefficient calculated with the original income data is $G = 0.5499$. This indicates a highly unequal income distribution, which is also shown diagrammatically by the Lorenz curve.

Shapley Decomposition

Regression Results with Stepwise Deletion

Stepwise deletion was carried out with the explanatory variables eliminating the least significant variables after each stage of regression. Six (6) highly significant variables were left after the series of elimination. These variables were the ones considered for Shapley decomposition. The final variables are shown in Table 4. The result of the analysis shows that 66.9% of change in per capita annual household income was explained by the explanatory variables. This indicates a model fit. All the six (6) variables are significant. Four of the explanatory variables are significant at 1%, while the remaining two are significant at 5%. The

marital status dummy is -1.444818. Being married is negatively associated with per capita household income. Marriage has responsibilities that come with it: more heads to cater for. The coefficient for the household size is -0.081968, which shows that as the household size increases, per capita household income falls. Households with large family sizes have high dependency ratio and consequent fall in per capita income. Education dummy is 0.543209. Having formal education increases the per capita household income. Land size relates negatively to the income with a coefficient of -4.412263. Land is more abundant in less-developed areas and those who are poorer are largely associated with farming. The magnitude is large. An increase in farm distance by 1km

translates to a 1.051650 increase in per capita household income ($\ln^{-1} 0.050360$). Cultivating distant farms means opening up new (fertile) lands and this translates to better yield and higher income. The coefficient of agricultural credit is 0.0000129. Farming household's income will increase by a unit (1) if agricultural credit is

increased by ₦1:00. The credit facility gives the farmer the ability of ejecting more funds to purchase inputs and utilise better farming technologies. These bring about higher yield, which ultimately leads to higher income and more savings.

Table 4: Regression results at the end of the stepwise deletion process

Variable	Coefficient	Standard Error	t-Statistic	Prob.
Coefficient	11.05256	0.274923	40.20242	0.0000
Marital status	-1.444818	0.294687	-4.902894	0.0000**
Household size	-0.081968	0.021070	-3.890279	0.0002**
Education	0.543209	0.161220	3.369367	0.0011**
Land size	-4.412263	2.169326	-2.033933	0.0451*
Farm distance	0.050360	0.021501	2.342168	0.0215*
Agricultural credit	1.29E-05	1.86E-06	6.939738	0.0000**

Source: Computer printout of results

** Significant at 1% * Significant at 5%

Dependent variable is the natural log of per capita annual household income [$\ln(\text{PCP})$]

$R^2 = 0.6906$, Adjusted $R^2 = 0.6685$

Log likelihood = -79.78295, Durbin Watson = 1.672370

Decomposition Results

In Table 5, decomposition results are presented. The table provides the summary of the factor contributions and the residual. G is the Gini coefficient calculated with the original per capita household income variable while \hat{G}_{TOR} was got with the estimated income when all the six (6) explanatory variables used for the decomposition analysis were included. The decomposition result is as follows. Marital status and household size had Gini coefficient values of 0.1437 and 0.1638, contributing 26.0% and 29.8% respectively. Education had negative Gini coefficient of -0.0822 and contributed -14.9% to overall inequality. Others are: land size, 0.0869 representing 15.8%;

farm distance, 0.0876, representing 15.9% and agricultural credit, 0.1020 representing 18.6%. Approximately Ninety-one percent (91.2%) of the total inequality, which amounts to 0.5018, was explained by all the explanatory variables while only 8.8% is left unexplained as the residual. The decomposition result is thus reliable. Income flows from education contributed negatively to reduce inequality, while the flows from other variables contributed positively to increase inequality. Education was thus the only equalizing factor with a significant impact, 14.9%. The equalizing effect is evident from the frequency distribution on education wherein 78.3% of the rural heads had undergone formal education ranging from primary (10.8%), secondary (20%) to tertiary (35%). Marital status contributed most to increasing inequality. This is in line with the result of the study conducted by Awoyemi (2004) on income inequality in Nigeria. The married household heads tend to have more responsibility in terms of more

persons to cater for thereby causing a reduction in the per capita income of its members. Household size is related to marital status. Households with higher family size have lower income, little savings and increased poverty. Coker (1999) also attributed high level of poverty to household size and points out that the larger the family size, the greater the chance of household being in poverty. However, labour productivity could be enhanced and market created for manufactured goods thus a need to work out a lasting balance.

Ownership of land is associated with higher income. Household heads with higher income have better access to land. However, this does not necessarily mean that the lands were purchased because land is known to be more abundant in less-developed areas and those who are poorer are largely associated with farming. The fact that some of the respondents have other sources of income in addition to farming might be responsible for this relationship. Having farmlands close to the residence and cultivating it on a continuous basis constitutes a burden on the land and this leads to declining yield. Those able to move farther away from home get better yield that translates to higher income. Agricultural credit represents an inequality-increasing factor. It contributes a significant percentage (18.6%) to overall income inequality after marital status and household size. The results points out that agricultural credit is not well distributed among the rural households whose significant percentage (78.3%) engages in farming either as primary or secondary occupation.

Table 5: Factor contributions to level of inequality using Shapley decomposition

Variable	Factor Contribution $C^1_{x_j, i=j}, i \neq j$	
	Gini	Percent
Marital status	0.143702895	26.0
Household size	0.163843059	29.8
Education	- 0.082189204	-14.9
Land size	0.086849319	15.8
Farm distance	0.087557975	15.9

Agricultural credit	0.102006984	18.6
\hat{G}_{TOT}	0.501771028	91.2
Residual	0.048215660	8.8
G	0.549986688	100.0

Source: Author's calculations

CONCLUSION AND RECOMMENDATION

From the results of this study, some issues are apparent. Most of the households sampled in the study area are male-headed and the heads are mostly married. Also, majority of the respondents are within the working age. This represents a pool of rural labour force for farming and other activities. The distribution of the household size shows that there is still high population density in the rural area, which implies that rural-urban migration might not be a problem anyway. Moreso, the rural-urban dichotomy is really thinning out as a result of infrastructural development and improved access to basic amenities. More than half of the respondents have farming as the major occupation. This is affirming the fact that farming still represents the backbone of rural economy. The results also show that non-farm income is an important component of rural economy too. This component helps in mitigating risks associated with farming, which is at subsistence level in the study area.

One other conclusion that could be drawn from the study is that the income inequality is high. The Gini value of 0.5499, the Kuznet's ratio value of 6.32 and the extent of the deviation of the Lorenz curve show this from the diagonal, are pointers to this fact. Also, both the poor and the rich in the rural households had equal access to education. The government had been able to provide equal opportunities for education though much is still left to be desired in the area of provision of facilities and infrastructural development. In addition, the extent to which rural households, especially those in the peri-urban, hold

tertiary education in high esteem is reflected. The credit policy of the government has not effectively served its purpose as it has contributed in creating the poor and the rich divide. It is evident from the result that all the farmers have small parcels of land for farming which on the average is 0.06 hectares in size.

In view of the findings made above, the following recommendations are put forward. Government should invest in human capital development of the rural households in order to improve their productive capacity. There is also need to grow the economy to keep pace with the population growth and the gains from the growth process should be distributed evenly to efface inequality together with its related problems. Agricultural credit should also be made accessible to the farming households to increase their capacity of acquiring more land and other farm inputs. The credit policy should be structured in such a way that all farmers have equal opportunities in terms of access and quantity. Furthermore, government should take rural infrastructural development serious for farming to thrive on a sustainable basis. Roads should particularly be constructed to open up more lands and provide a network for quick evacuation of yields to both rural and urban markets. Small-scale farmers still dominate the farming business; therefore, an all-encompassing programme should be put in place to improve their standard of living.

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