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# AN EMPIRICAL ANALYSIS OF THE POVERTY STATUS AND PRODUCTIVITY OF RURAL FARMERS IN OBUBRA, CROSS RIVER STATE, NIGERIA

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## ABSTRACT

*This study examines poverty and resource-use efficiency among rural farmers in Obubra, Cross River State, Nigeria. Findings reveal that poverty is more severe in female-headed households than male-headed ones. Productivity estimates show that the moderately poor farmers were more efficient in the use of most resources, than the core poor and the non-poor. Generally, however, all groups of farmers were inefficient in the use of every input except labour. The results call for the provision of an enabling environment that would reduce poverty among rural farmers, and promote the prudent management of available farm inputs by farmers. This is expected to achieve efficiency and ultimately, sustainable increases in agricultural production.*

JEL classification: J15, Q12, R13

## 1. Introduction

THE twin issues of poverty and agricultural production present a paradox in Nigeria. About two-thirds of the Nigerian populace reside in the rural areas where agriculture is the main occupation; poverty is also more prevalent in the rural areas (Olayide, 1980; Olayemi, 1980; World Bank, 1996). The Nigerian smallholder farmer produces the bulk of agricultural output for the nation. Farmers produce either for subsistence, for sale or both. Although farmers are resource-poor, Dittoh (1994) submits that the poor seem to be the most productive group as their contribution to GDP has amounted to 39 per cent between 1993 and 1997 (CBN, 1997). Schultz (1964) attests to the efficiency of farmers in developing countries when he remarks that farm families are efficient but poor.

He reasons that low productivity is an aspect of the vicious cycle of poverty in which many developing countries are trapped.

In recognition of the dual but contrasting influence of agricultural production and poverty, emphasis is now placed on enhancing agricultural productivity on one hand and alleviating poverty on the other. Sufficient merit therefore exists for a study of the poverty and agricultural productivity nexus. If done within the context of poverty status, such a study will engender the determination of efficiency, or otherwise, of resource use among farmers of different poverty status. The choice of Obubra area of Cross River State is premised on the typical rural nature of the area. In line with the above, this paper examines how efficiently farmers in Obubra Local Government Area of Cross River State use their resources. This will be achieved within the framework of the following specific objectives:

1. to assess the poverty status of the respondents
2. to determine the resource-use efficiency of respondents
3. to make policy recommendations based on the findings of the study

In the rest of the paper, section two is devoted to the theoretical framework and literature review, section three is the methodology, while section four presents results and discussion. The last section is the conclusion.

## **2. Theoretical Framework and Literature Review**

Poverty as a development issue has captured the attention of both national governments and international development agencies for several decades. Since the mid-1980s, reducing poverty has become a major policy concern for governments and donor agencies.

Poverty is said to exist when a person falls below a certain level of economic well-being considered to constitute a reasonable minimum, either in some absolute sense or by the standards of a given society. Starting from the classical economists (1750-1850), the concept of poverty has been modified. In recent literature, poverty is considered broadly from two perspectives: economic and cultural. From the economic point of view, poverty is seen in terms of external circumstances that inform an individual's economic decisions and transactions. This places emphasis on income (disposable income) required to support a minimum standard of decent living (Booth, 1989). From this definition of poverty has arisen the concept of absolute and relative poverty. Absolute poverty indicates an income level below which minimum standards of nutrition, shelter and personal amenities cannot be attained. Relative poverty, on the other hand, depicts extreme differences in the levels of living between the top and bottom strata of the society.

It is concerned with the degree of income inequality (Ahluwalia, 1976; Alamgir, 1983).

Differing markedly from the economic perspective of poverty, the cultural perspective gives prominence to internal attitudes and behaviour patterns an individual may bring to any given set of circumstances (Watts, 1977). Okoh (1997) described poverty from both the economic and cultural perspectives, as a state of deprivation, in terms of both economic and social indicators, such as income, education, health care, access to food, social status, self-esteem and self-actualization. In an attempt to alleviate poverty, efforts in the recent past have focused on areas where poverty is severe and where people are more affected by the 'malaise' of poverty. Thus, such terminology as the 'feminization of poverty' has found its way into the literature on poverty (Glewwe, 1988; Grosh et al., 1994). There is also the description of poverty as a rural phenomenon. For instance, rural people have been reported to be economically and socially disadvantaged. Their disadvantaged status has its origins in institutional, human capital, and geographical marginalization. They have minimal capital to invest in improving their socioeconomic condition (Durant and Knowlton, 1973; Tienda, 1981; Kuvlesky, 1982).

Studies on the measurement of poverty at the micro level have centred on determining the yardsticks for assessing standards of living, defining a poverty line, and constructing an appropriate poverty profile. While macro level studies usually involve comparing poverty statistics across regions, countries or periods. The measurement of poverty often begins with defining the poverty line, which is generally based on income or consumption data.

The poverty line represents the income level which categorizes households of a particular size, place and time into poor and non poor (Okoh, 1997). In this study, the poverty line is set using 'mean per capita household expenditure' (MPCHHE) (World Bank, 1993). The MPCHHE is the average amount spent by an individual within a given society on food. Other methods which have been used in the literature for the same purpose, are the 'cost of basic needs' (CBN), 'food energy intake' (FEI) and the poverty profile.

The poverty profile is merely an analytical tool for identifying sources of income, consumption patterns, economic activities and living conditions of the poor. The common poverty indices employed to determine the incidence, intensity and severity of poverty include the headcount index, the poverty gap index and Foster-Greer-Thorbecke squared poverty gap index (for detailed explanation see Okoh, 1997). The Lorenz curve has also been very popular, particularly in the measurement of relative poverty. It identifies the degree of income inequality among households in a region within or over a period of time.

The undesirable relationship between poverty and productivity and the consequences of the former on the latter are disturbing. This is due to the negative impact poverty is known to exert on productivity (Dittoh, 1994).

Productivity is generally measured in terms of the efficiency with which factor inputs, such as land, labour, fertilizer, seeds, tools and equipment are converted to output within the production process. Ehui and Spencer (1990) identified two measures of productivity, namely partial productivity, and total factor productivity (TFP). Partial productivity is measured as the ratio of output to a single input. The ratio of output to all inputs combined is the total factor (or multi-factor) productivity. Earlier attempts to measure productivity were based on partial productivity indices. Although these approaches are computationally simple and provide various insights into the efficiency of input in the production process, they mask many of the factors that contribute to observed productivity growth. Total factor productivity increase is based on comprehensive aggregates of outputs and inputs, and changes in the quantity and quality of all inputs which can be accounted for (Capalbo and Vo, 1988; Antle and Capalbo, 1988).

Generally, two approaches are used in measuring TFP. These are the growth accounting or index number approach and the econometric or parametric method. The growth accounting approach involves the development of indices of output and input and the computation of non-parametric factor productivity measures. The econometric method is based on an econometric estimation of the production function or the underlying cost or profit function. In this study, the production function is used to measure the productivity (or resource-use efficiency) of different classes of poor farmers and non poor farmers.

From the production function, we derived the conventional neoclassical test of economic efficiency. The rule of this test is that the slope of the production function (MPP) should be equal to the inverse ratio of input price to output price, at the profit maximization point. This is given for instance as:

$$MPP_{La} = \frac{P_{La}}{P}$$

where:

- $P_{La}$  = the price per hectare of land
- $P$  = the output price
- $MPP_{La}$  = the marginal physical product of land
- $MVP_{La}$  =  $K$

where:

- $MVP_{La}$  = Marginal value product of land
- $K$  = numerical constant

In an attempt to substantiate the efficiency hypothesis, focus is centred on the estimated value of  $K$  and its closeness to 1 (one). Efficiency is attained if:

$$MVP = MFC$$

where:

$$MFC = \text{marginal factor cost}$$

### 3. Methodology

#### 3.1 Sources and methodology of data collection

This study was carried out in Obubra area of Cross River State, Nigeria. The data for the study came from the primary source with the aid of well-structured questionnaires. The questionnaires were administered to 110 respondents selected through multi-stage sampling procedures. The first stage involved the random selection of two out of eight clans in the local government area. These were the Osobong and Adun clans. In the second stage, two villages were randomly selected. Based on the available farm household list from the Cross River Agricultural Development Project, final samples were drawn using systematic random sampling procedures. This entailed listing every sixth farm household in the villages using probability samples proportionate to size. In the final analysis, 60 respondents were drawn from Osobong clan while 50 respondents were drawn from Adun clan. Responses from 86 farmers were finally used in the analysis as 14 of the questionnaires were discarded due to inconsistencies in the information provided.

#### 3.2 Method of data analysis

Three analytical frameworks were used in analyzing the data collected for this study. First, income distribution (a measure of the depth of poverty) among the farmers and across gender was assessed with the use of the Lorenz curve and Gini coefficient. The Gini coefficient is given by:

$$G = 1 - \frac{\sum (X_{i+1} - X_i)(Y_{i+1} + Y_i)}{2 \sum Y_i} \dots \dots \dots (1)$$

where

- $G$  = Gini coefficient or Gini ratio
- $X_i$  = Frequency of respondents' in the  $i$ th group
- $Y_i$  = Share of respondents' income in the  $i$ th group.

The larger the figure, the more the dispersion of income among respondents.

Second, in order to classify people into the various poverty groups, relative poverty lines were constructed. Following the World Bank (1993) method, total

household expenditure (made up of cash expenditures on the consumption of goods and services) and the value of transfers and remittances received in barter transactions were computed. Based on this, mean per capita household expenditure (MPCHHE) was calculated. In relation to the standard of living and with reference to MPCHHE, two poverty lines were set. These were the ‘core poverty line’ equivalent to one-third of MPCHHE and the ‘moderate poverty line’ equivalent to two-thirds of MPCHHE. The respondents were then grouped into core poor, moderately poor and non poor households.

The third analytical procedure employed was regression analysis. This was used to obtain the parameters for the measurement of resource productivity of the three groups of farmers identified. Four functional forms were tried on each set of equations and the lead equations were selected based on economic, econometric and statistical criteria including the signs and magnitudes of the coefficients, the magnitudes of  $R^2$ , T-statistics and F-statistics, (Kmenta, 1986; Koutsoyiannis, 1977; Olayemi, 1998). The functions experimented with were linear, semi-log, double log and exponential. The implicit function can be represented by the following equation.

$$Q_i = f(x_1, x_2, x_3) \dots \dots \dots (2)$$

where:

- $Q_i$  = Crop output (in naira). Multiple cropping is predominant in the study area. Therefore, the value of each enterprise was aggregated to obtain the total crop output of each respondent.
- $x_1$  = Cost of labour (in naira). There are three types of labour in the study area: family, hired and exchange. These were combined to give total labour used by the farmers. It was measured in man-days.
- $x_2$  = Cost of capital (in naira). Common capital goods used by farmers in their operations include cutlasses, basins, files, among others. The cost of each item was added up to obtain the cost of capital.
- $x_3$  = Farm size (hectares)

**4. Results and Discussion**

**4.1 Socio-economic characteristics of farmers in Obubra**

Out of 110 respondents who participated in the survey, 86 (78%) were male and 24 (22%) were female. The age of respondents ranged from 20 years to 65 years. The average age of the male respondent was 45.6 years, while the average for the female respondent was about 42 years. This shows that most of the respondents were still active (in the labour force), though the modal age group for the

respondents was between 41 and 50 years. In terms of educational status, about 47 per cent of the male respondents and 50 per cent of the female respondents had no formal education. Approximately 50 per cent of both male and female respondents had at some primary education. Only 3.5 per cent of the male respondents had tertiary education.

Farm sizes ranged from as low as 0.4 hectare to 5 hectares, but the majority of the farmers had between 1 and 2 hectares. Sources of labour included personal exchange, family and hired. The majority of the farmers (about 54%) performed their farm activities themselves, while 25 per cent of the farmers claimed to use family labour. The average monthly income of families engaged in farming as a means of livelihood was ₦5,896.40 for male-headed households, and ₦3,852.86 for female-headed households. Hence, income from male-headed farm households was 53 per cent higher than female-headed households.

Tables 1 and 2 present the socio-economic characteristics and income categories of farming households. Table 2 shows that the modal income for male-headed farm households and the generality of respondent households is between ₦1,501.00 and ₦2,000.00; for female-headed farm households, the modal income range was between ₦501.00 and ₦1,000.00. No female-headed household earned more than ₦4,000.00 per month; the average monthly income in the study area was ₦4,874.63. The average income of male-headed households was a bit higher than the overall average in the study area. The results go to confirm the assertion that poverty is more severe in female-headed households. Poverty in the female-headed households may not be unconnected with the socio-cultural situation in the study area which hinders women from fully undertaking some income yielding activities. For instance, traditional land tenure norms restrict women's access to land, which is an important factor in their farming activities.

In consonance with the objectives of this study, poverty indicators for the study area were computed and presented in table 3. The mean household expenditure was found to be ₦4,466.17. There was an average of four persons per household, thus, giving rise to a MPCHHE of ₦1,116.54. The core poverty line was estimated at ₦368.46, while the moderate poverty line stood at ₦748.08. On the basis of the above figures, about 82 per cent of the respondents can be classified as either core poor or moderately poor. The remaining 18 per cent are non poor. Specifically, about 23 per cent of the respondents were core poor. The survey results confirm the premise that poverty is more predominant in the rural areas. The Lorenz curve estimate with Gini coefficient (figure 1), indicates that the incomes of male farmers are not widely dispersed. The Gini coefficient for male, female and the whole area are 0.15, 0.911 and 0.473 respectively. These results confirm that income disparity and levels of poverty are high among the entire farming population, but greater among female farmers than male farmers.



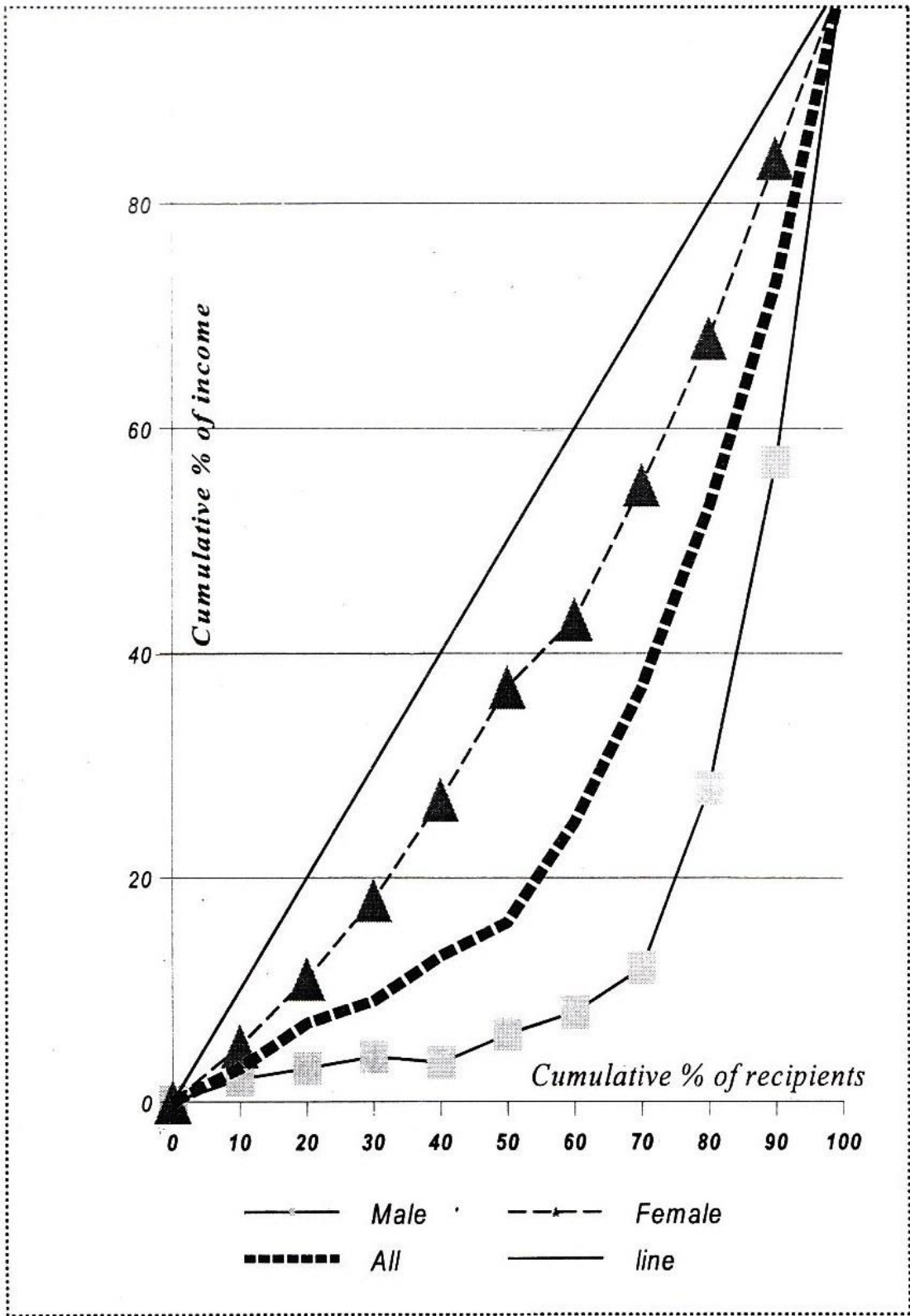
**Table 1. Selected Socioeconomic Characteristics of the Farmers in Obubra**

Characteristics	Male-headed households		Female-headed households	
	Frequency	Percentage	Frequency	Percentage
<b>Age</b>				
≤ 20	5	4.54	0	0.00
21 - 30	14	12.73	1	0.91
31 - 40	20	18.18	8	7.27
41 - 50	30	27.27	12	10.91
51 - 60	13	11.82	2	1.82
> 60	4	3.64	1	0.91
<b>Total</b>	<b>86</b>	<b>78.18</b>	<b>24</b>	<b>21.82</b>
<b>Educational level</b>				
No formal education	40	36.36	12	10.91
Primary	23	20.91	8	7.27
Secondary	20	18.18	4	3.64
Tertiary	3	2.73	0	0.00
<b>Total</b>	<b>86</b>	<b>78.18</b>	<b>24</b>	<b>21.82</b>
<b>Number of persons per room</b>				
1-3	36	32.73	9	8.18
Over 3	50	45.45	15	13.64
<b>Total</b>	<b>86</b>	<b>78.18</b>	<b>24</b>	<b>21.82</b>
<b>Size of farm owned (ha)</b>				
≤ 2	67	60.91	22	20.00
3-4	16	14.54	2	1.82
5 and above	3	2.73	0	0.00
<b>Total</b>	<b>86</b>	<b>78.18</b>	<b>24</b>	<b>21.82</b>
<b>Source of labour</b>				
Family	66	60.00	21	19.09
Exchange	9	8.18	2	1.82
Area	11	10.00	1	0.91
<b>Total</b>	<b>86</b>	<b>78.18</b>	<b>24</b>	<b>21.82</b>

Source: Field Survey, 1996.

#### 4.2 Resource-use efficiency

Having grouped the samples into core poor, moderately poor and non poor, based on the MPCHHE, the influence of production input on the crop output of the groups was determined with the aid of regression analysis. On the basis of the *a priori* expectation, the statistical significance of the coefficient and the coefficient of determination, the double logarithm functional form was chosen for the three groups. Table 4 presents the results of the analysis.



**Figure 1. Lorenz Curve of the Distribution of Income for Male, Female and All Respondents**

**Table 2. Classification of Household by Income Group**

Income Group (₦)	Male respondents		Female respondents		All respondents	
	Frequency	%	Frequency	%	Frequency	%
≤ 500	5	5.8	5	20.83	10	9.09
501 - 1000	0	0	8	33.33	8	7.27
1001 - 1500	10	11.63	2	8.33	12	10.91
1501 - 2000	37	43.02	3	12.50	40	36.36
2001 - 2500	8	9.30	2	8.33	10	9.09
2501 - 3000	6	6.98	1	4.17	7	6.36
3001 - 3500	4	4.66	1	4.17	5	4.55
3501 - 4000	8	9.30	2	8.33	10	9.09
4001 - 4500	5	5.81	0	0	5	4.55
> 4500	3	3.49	0	0	3	2.73
Total	86	100.00	24	100.00	100.00	100.00
Mean Income (₦)	5896.40		3852.86		4874.63	

Source: Field Survey, 1996.

The results presented in table 4 show that all inputs (labour, capital and farm size) are positively related to the output of the three poverty groups. The value of the adjusted  $R^2$  reveals that about 89 per cent, 43 per cent and 27 per cent of the variations in the output of core poor, moderately poor and non poor farmers respectively, were explained by the independent variables. The  $R^2$  for the core poor and non poor are small in relation to the  $R^2$  of the moderately poor. This may be explained more by the small sizes of the two sample groups (ie, 25 = core poor and 20 = non poor), than by the non-inclusion of important explanatory variables in the model. It is the same variables which explain 89 per cent of the variation in the output of the core poor that were used in the models for these other two groups. The F-test shows that the model performed exceedingly well for core poor, fairly well for moderately poor and not so well for non-poor farmers. Overall, it appears that the three variables (labour, capital and farm size) affected the production activities of the core poor more than they influenced the activities of the other two groups. Incidentally, capital and farm size significantly affected the output of core-poor farmers even at one per cent level. On the other hand, labour affected the output of the moderately poor and non poor at 1 and 5 per cent levels of significance, respectively. Since the coefficient of the double log equation is the elasticity, the following can be inferred: first, for the core-poor respondents,

a 10 per cent change in the level of capital and farm size will lead to 2.4 per cent and 6.5 per cent changes in output respectively. Similarly, the moderately poor will record an increase of 3.5 per cent in output as a result of 10 per cent increase in the level of labour. Lastly, a 10 per cent change in farm size will lead to 5.5 per cent change in the output of non-poor farmers.

**Table 3. Poverty Line and Other Indicators for Obubra**

Mean Expenditure	₦4466.17
MPCHHE:	₦1116.54
Core Poor (1/3 MPCHHE): Poverty line Percentage of sample	368.46 22.73
Moderately Poor (2/3 MPCHHE): Poverty line Percentage of sample	748.08 59.19
Non Poor: Percentage samples	18.28

Mean per capita household expenditure.  
Source: Computed from field data 1996.

The values of the function coefficient which range from 1.306 among the core-poor farmers to 1.556 among the non poor, shows increasing returns to scale, suggesting that these groups of farmers can increase their farm output by employing more of these three resources. In summary, while land and capital are limiting factors in the production activities of core-poor farmers, labour is the main production constraint of the moderately-poor and non-poor farmers. Core poor farmers appear to have sufficient labour, but lack adequate capital and land. By contrast, the moderately poor and non-poor farmers may be involved in other income generating activities apart from farming. As such, they may use hired labour on their farms, which is likely to present a constraint to their production, especially during peak periods when labour becomes scarce.

Measures of technical efficiency of resource-use such as mean, average physical product (APP), marginal physical product (MPP), marginal value product (MVP) and marginal factor cost (MFC) were derived and presented in table 5.

Table 5 reveals that the average resource-input used by the moderately poor farmers was greater than the average resource-input employed by both the core poor and non poor farmers. This suggests that increasing the level of resources by the same proportion for the three groups, would lead to a greater increase in the level of output among the moderately poor farmers compared to the other two groups. This could be attributed to certain factors. First, the moderately poor farmers may be able to afford improved agricultural technologies and better

management, while the core poor are still using out-dated technologies, which are known to be less productive. The non poor on the other hand, may not be prudent in the use of available farm inputs, because they can afford more due to their affluence. This may account for the inefficient use of resources use observed among the core-poor and non-poor farmers.

**Table 4. Regression Results for Core Poor, Moderately Poor and Non Poor**

Item	Core poor (n = 25)	Moderately poor (n = 65)	Non poor (n = 20)
Constant	7.225	6.297	7.068
Log $x_1$	0.416 (0.712)**	0.345 (4.226)**	0.226 (1.561)
Log $x_2$	0.242 (6.724)**	0.979 (1.224)	0.787 (1.391)*
Log $x_3$	0.648 (10.192)**	0.178 (0.941)	0.553 (1.829)
R <sup>2</sup>	0.894	0.428	0.269
F-value	41.485**	8.870*	2.399
Se	0.163	0.626	0.176
DW	1.834	1.911	1.485

\*\* Significant at 1 per cent probability level.

\* Significant at 5 per cent probability level.

Source: Computed from field data 1996.

Figures in parentheses are t-ratios.

**Table 5. Values of Estimates of Efficiency Parameters**

Resource	Mean	APP (Average physical product)	MPP (marginal physical product)	MVP (marginal value product)	MFC (marginal factor cost)	Efficiency gap	% Divergence
<b>Core Poor:</b>							
Labour ( $x_1$ )	113.80	1.98	0.21	390.6055.	80.00	310.6	79.52
Capital ( $x_2$ )	21.00	8.88	0.03	55.80	300.00	-244.2	-437.63
Farm Size ( $x_3$ )	1.96	8354.55	0.00006	0.1116	500.00	-499.89	-447928.67
<b>Moderately Poor:</b>							
Labour ( $x_1$ )	92.84	2.92	0.12	252.60	80.0	172.60	68.33
Capital ( $x_2$ )	20.60	11.12	0.09	189.45	300.00	-110.55	-58.35
Farm Size ( $x_3$ )	2.43	11278.92	0.00002	0.0421	500.00	-499.96	-
<b>Non poor:</b>							
Labour ( $x_1$ )	60.00	2.52	0.09	225.00	80.00	145.10	64.44
Capital ( $x_2$ )	81.67	8.2	0.09	225.00	300.00	-75.00	-33.33
Farm Size ( $x_3$ )	4.55	1074.73	0.00005	0.125	500.00	-499.88	-3999.00

Source: Computed from results in table 4.

The values of the marginal physical product show that the core-poor farmers are more efficient in the use of labour than the moderately-poor and the non-poor farmers. This result suggests that if additional labour were available, it would lead to an increase in crop production/yield among the core poor farmers than the other two groups. The capital employed in crop production led to a greater increase in the agricultural output of the moderately poor and non-poor farmers than for the core poor. This implies that these two groups of farmers were more technically efficient in the use of capital than the core poor farmers. Of all the resources used, farm size had the least marginal physical product and this cut across the three categories of farmers. This shows inefficiency in the use of available land. Obubra is a rural settlement with abundant cultivable land. The abundance of land may be responsible for its not being prudently managed to achieve efficiency.

Given the level of technology and prices of both inputs and outputs, efficiency of resource use was further ascertained by equating the marginal value product (MVP) to the respective marginal factor cost (MFC) of resources. A resource is said to be optimally allocated if there is no significant difference between the MVP and MFC.

Table 5 further reveals that with the exception of labour, which shows 79.52, 68.33 and 64.44 per cent divergence for the core poor, moderately poor and non-poor farmers respectively, all other inputs showed a negative divergence between MVP and MFC. Given the observed inefficiencies in the use of most resources by all the categories of farmers, the question could be posed: why are farmers still producing when they are technically inefficient? The primary objective of traditional agriculture production is to ensure household food security. Thus, households will continue to produce crops even when they are not very efficient in the use of resources.

## **5. Conclusion**

Findings from this study confirm that more female-headed households have less income than male-headed households, and that income distribution among the female-headed households is extremely skewed. Equally, various efficiency parameters revealed that the core poor households were technically inefficient in the use of farm resources. The results suggest the need to pursue vigorously, those actions and policies that would reduce poverty to the barest minimum. The most vulnerable group, ie, female-headed households, need to be given urgent attention so that they can become financially independent.

The inefficiency of the farmer may be directly or indirectly linked to the level of poverty in the study area. Two factors, the inefficient use of resources and poverty, seem to be interrelated. If poverty is to be reduced among farming households, productivity must improve. Improvement in the level of productivity, among the poor is the responsibility of the individual farmers, government, and

non government organizations. The farmers could improve their productivity through the adoption of compatible and output boosting technologies, such as high yielding crop varieties, hybrid seeds, fertilizer, etc. Available resources must also be managed more prudently. Government and non government organizations could also provide improved technologies through efficient extension systems. The provision of improved rural infrastructures and enabling policies, among others, are also required in order to boost productivity, especially among the disadvantaged farming populations.

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