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**COMPARATIVE ANALYSIS OF THE IMPACT OF
WORLD BANK ROOT AND TUBER EXPANSION
PROGRAMME ON POVERTY ALLEVIATION OF PERI-
URBAN AND RURAL COMMUNITIES IN BENUE
STATE, NIGERIA.**

BY

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Key words: *World Bank, Poverty Reduction programme valued output and Discriminant Function.*

1.0 INTRODUCTION

1.1 Background Information

Poverty has conceptual diversity as opined by World Bank (2000/2001), Robb (2002), Chambers (1983), Obinne (1998), Olayemi and Olayide (1977), Ayoola *et.al.* (2001) and UNDP (1994). The general consensus is that absolutely, poverty is a living condition in which a person or group of persons are unable to satisfy most basic and elementary requirement for human survival in terms of good nutrition, clothing, shelter, foot wear, energy, transport, health, education and recreation. These characteristics of poverty differ from one social group to another, geographically, politically, economically and must be stemmed through measures of poverty alleviation. Poverty alleviation according to Ater (2003), is sustainable productive capacity for goods and services as a measurable output value, that generates income sufficient for decent food, shelter, clothing and life quality generally. According to World Bank (2000/2001), three quarters of the poor in sub-saharan Africa lack this capacity, they live, work in the rural areas and depend mainly on farming or farm labour for their sustenance. In addition, livelihood improvement interventions have yielded lesser impressive results in the typically rural communities compared to the semi urban-communities. Nigeria is still ranked among the poorest nations in the sub-saharan Africa. The middle Belt where Benue State lies in Nigeria accounts for 19 percent of the population; 21% of the poor and 22% of the extreme poor World Bank

(1996b). Poverty level in Benue State is regarded severe, widespread and multi-dimensional requiring aggressive mitigative measures (F.O.S, 2001).

Benue State the leading producer of cassava (Manihot. Esculentus krans) in the country is naturally endowed, typically agrarian, with remarkable contribution to the millions of metric tones recorded for cassava (3.5779T), yam (2.8707T) and sweet potato (0.179T) in 2003/2004 production season. The state contributes effectively in making Nigeria the leading world producer of cassava. In the 2003/2004 season, Nigeria recorded national production figures were 28.5, 21.7 and 1.15 million metric tones for cassava, yam and sweet potato respectively in that sequence (P.C.U, 2004). Most of the recorded output, came from small scale holders. These small holders are characteristically dichotomized peri-urban and typically rural root and tuber producers accounting for over 95 percent of root and tuber output in Nigeria. While the peri-urban small scale holder with about two hectares of cropped land earns fairly attractive income brackets from root and tuber farm-firm investment, the typically rural producer with similar enterprise size receives relatively lower income brackets with corresponding lower quality of life, even though they are both producers of crops that provide fuel and energy in sovereign Nigeria. The indisputable income dichotomy in small scale root and tuber production, processing and utilization informed the basis for this study in Benue State. The study looked at the differences in income streams, valued output and diversified uses of these energy crops with the aim of delineating causes and effects in poverty alleviation disparity among peri-urban and typically rural producing communities in Benue State. Benue State is termed the Food Basket of the Nigeria Nation and is centrally located in Nigeria in the middle belt. It has adequate potentials for production of wide range of crops found in the Northern and southern ecologies and thus suitable for the conduct of this study which involves crops grown along length and breadth of the country Nigeria.

1.2 Benue State Root and Tuber Production Scheme

The entire 413159 farm families in Benue State produce at least one form of root and tuber crops World Bank (1996c). Reasons for the sweeping interest include food sustenance, consumption-income and business cash. The decision by the State Government to participate in the supported programme by International Fund for Agricultural Development (IFAD) is aimed at touching the livelihood of all small scale producers in the State. The Root and Tuber Expansion Programme (RTEP) provides beneficiaries', extension support, improved planting materials as well as office back up funds for operations. The aim is to increase production for

enhanced National food self sufficiency, rural household food security sustenance as well as increased income and quality of life improvement for small scale holders. The programme commenced in 2000 and has been on for five years. The base cost is estimated at (USD 21.4 million) or ₦2,304.6 million. It covers the period of eight years. Funding is tripartied in the ratios of 60:30:10 for International Fund for Agricultural Development (IFAD), Federal and State Governments of Nigeria respectively. Benefiting famers are expected to own at least three hectares of farm land in addition to being members of registered cooperative producer groups of roots and tubers.

1.3 The Justified Role of Root and Tuber Research

Agriculture specifically roots and tubers continue to play the major role of food source in the sub-Saharan region of Africa as noted by (Aliyu and Bakshi 1977, Upton, 1973 and Pursglove, 1975). This important role notwithstanding recorded declining relative contribution to growth and development as its share of Gross Domestic product or National income over the years in Nigeria (F.O.S, 2001 and Ukpong, 1993). Numerous factors contribute to the observed trend in the role of roots and tubers to development in Nigeria. Major among these factors obviously are: geo-spatial location, technological, infrastructural, pathological microbes, insects and pests, material shortages and markets as well as myopic conservatism of government policies and rural inhabitants personal characteristics. Though Obinne (1998) and Obinne (1999) linked rural poverty to, personal characteristics and habits of rural dwellers generally, major contributors to poverty were Laziness, carelessness, drunkenness, large family size, theft, witchcraft and womanizing. One important consideration remains certain about earlier authors concerning rural poverty. The typically rural farmer was studied under his natural predicament, heavily burdened with absolute lack of capital coupled with complete absence of any form of empowerment. These contributed in concealing obvious policy short-falls that needed to be addressed to accelerate poverty alleviation of the typically rural producer. Geo-spatial location of respondents coupled with the widening differences in communication and marketing opportunities as well as myopic conservatism in policy framework properly articulated in this research, contributed to the observed economic and social disparity among root and tuber producing communities in Benue State, following empowerment of both the typically rural and semi-urban root and tuber producers, and thus necessitates this research.

1.4 Measurement of Poverty and Poverty Alleviation

Poverty as a multi dimensional syndrome can be felt, assessed, measured and even given an ordinal treatment as opined by Sen, (1976). This is the view held by Musgrave and Feber (1996), who identified the poor by estimating their consumption expenditures. Similarly other authors conceptualized poverty as causal effect phenomenon (World Bank, 1996d and Black wood and Lynch, 1994). In this study, the author looks at poverty alleviation as a measurable index that can be studied under a causal effect relationship. Income realized from valued output being used as an alleviation index with measurable indicators contributing to the respondents income as independent variables for beneficiary respondents in Benue State Nigeria.

1.5 Problem Statement

Past interventions into roots and tubers production by government and non-government agencies have succeeded in increasing production as evidenced in past reports (World Bank, (1996e) and World Bank, (1997). Often increased production resulted in produce glut. This situation culminated into rock-bottom prices in the producing communities and dis-incentive to producers. Under the present dispensation, the Expanded Programme for Roots and Tubers (RTEP) has made provision for improved technologies to increase production. Above all, concerted efforts are in place to strengthen downstream activities. This, is believed, would check incidences of low prices in producing communities, bridge income disparities, enhance employment and check rural youth unrest. However there is still recorded disparities in income and general economic fortunes between typically rural and peri-urban root and tuber producer. While the peri-urban producer accesses markets year-round, the typically rural producer seasonally does so, due to infrastructural constraints that bring about difference in prices regimes of same products. Proportion of expendable income and quality of life for these two groups of producers are also not the same. The peri-urban root and tuber producer appears relatively better off. His sustainable productive capacity for goods and services as measurable output value, that generates income sufficient for decent food, shelter, clothing and life quality are all better than the rural producer. The ability of the peri urban small scale holder to earn higher income, pay for services and goods is glaringly better than that of the typically rural producer. This obvious difference in the earning capacity presents a sharp dichotomy in living standard and quality of life. There is need to undertake indepth study in both peri-urban and typically rural household communities, to analyse this dichotomized group of small scale producers in Benue State.

1.6 The objectives of the Research

The broad objective of this study is to determine how root and tuber industry has contributed to livelihood, poverty alleviation and quality of life improvement among producing communities in Benue State Nigeria. Specifically, the objectives are to:

- (i) delineate respondents age and distribution.
- (ii) estimate enterprise earnings and contribution to valued productivity within and across producing communities
- (iii) analyse poverty alleviation function for root and tuber communities in Benue State
- (iv) compare financial well being and quality of life between rural and peri-urban producers of root and tubers
- (v) identify factors contributing to the differences in quality of life, financial worth and capacity for command of goods and services (CCGS).
- (vi) make recommendation based on study findings.

2.0 METHODOLOGY

2.1 Study Area

Benue State Nigeria, the study area has a total land mass of 30.955 million square kilometers and a population of 2,780,398 (Nigeria census, 1991). It was created out of Benue Plateau in 1976. The State has 23 Local Government Areas, the Headquarters is Makurdi. Located between longitudes 6°35'E and 10°E and between Latitudes 6°30'N and 8°10'N the state has abundant land estimated to be 509 million hectares. This represents 5.4 percent of the national land mass. Arable land in the state is estimated to be 3.8 million hectares according to Wardrop, (1993). The State is predominantly rural with an estimated 75 percent population engaged in rain-fed subsistence agriculture. Commonly grown crops in 2004 were yam, cassava, sweet potato, maize, Guinea corn, millet, groundnuts, soyabeans and ben niseed.

2.2 Materials and Methods

Using Benue State village listing survey list which consists 30 peri-urban and typically rural communities each, ten communities were each selected using random selection through balloting/reshuffling selection. This was followed by selection of eleven respondents randomly from Household Listing Survey list in each of the communities. A total of 110 respondents each from peri-urban and typically rural communities were selected for data collection. Screening after data collection rendered six forms disqualified each from peri-urban and typically rural communities. The total of 104 respondents each were analysed from peri-urban and typically rural communities respectively.

2.3 Variable Measurement and Data Collection

Data were collected on socio-economic variables for analysis and reporting in selected communities. These were: Mu, Fiidi, Wanune, Yandev, Gube, Katsina-Ala, Apir, Utonkon,

Adoka and Ugbokolo for peri-urban communities. Typically rural communities were: Ihugh, Korinya, Jato-Aka, Kyado, Ugba, Buruku, Akpaegher, Otobi, Oju & Ohimini. Care was taken to measure some variables in kilometers via trained Enumerators motorcycles used for data collection. These variables were: Household distance to the nearest rural market of product sale, Household distance to urban markets, Household distance to motorable roads, laterite and tarred, valued output was estimated in 100 kilogram unit of sale at market prices prevailing during sales period, marketable surpluses in Naira were estimated in kilogram sales unit at prevailing prices at the period of sale, while out put sales price was obtained as revenue receipts in national currency as Naira per kilogram of output. Income earned was estimated as total revenue receipts in national currency as monetary sales from output of root and tubers, quality of life score was estimated as the mean score, for housing type score, meat intake score, defecation score and literacy score. Mobility score a measure of type of means of moving to the farm was given scores ranging from trekking (the least score) to motor vehicle (highest score) as a means of mobility.

Analytical Techniques

Simple descriptive statistics and discriminant function analysis, were used. A discriminating function of income earned was fitted. Earned income in Naira was used as poverty alleviation index, and also the basis for observed dichotomy in the two distinct groups. Alleviation dichotomy was analysed using independent variables like: Household distance to nearest urban market, Household distance to tarred/laterite road for product evacuation. Marketable surpluses, Average price receipt per kilogram root and tuber in the best market of sale, quality of life score and mobility score. These variables were fitted into a discriminant function (Z) for analysis. According to Fisher, (1936) and Olayemi and Olayide, (1977) the technique aims at coefficients (Y_i) such that the squared differences between groups is maximized while difference within group is least. The equation that analyzed the functional relationship according to Umeh (1992), is a transposed linear matrix with simplified representation as: $DDI = Y = b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6$ = The total Discriminant score for peri-urban and rural communities. Where Y = The Discriminating dichotomized Income Index in Naira for the two groups. (Peri-urban and typically rural producers), X_i = (X₁, X₂X₆) = quantifiable socio-economic variables with causal relationship to output of the producer, valued as income and

X₁ = Household distance to the nearest urban market in kilometres

X₂ = Household distance (k/meters) to the nearest laterite/tarred road of produce evacuation

X₃ = Marketable surplus values in Naira

X₄ = Average price receipt per kilogram root and tuber in the best market of sales.

X₅ = The quality of life score (index).

X₆ = The mobility score

Results and Discussion

The impact of poverty alleviation programme on root and tuber producers was conspicuous on valued output, sales income receipt, marketable surpluses, housing quality and quality of life in general. Age determines human energy and to a large extent active participation in productive agricultural industry because a lot of energy is utilized for effective arable crops production in developing nations. The distribution of the age groups in both communities revealed a similar pattern. Youth in the industry totaled 40.3% and 40.3% for rural and peri-urban producers. Aged producers in the industry were 22.1% and 21% respectively for rural and peri-urban producers. Comparism of the productivity of these two groups of producers is therefore based on level plane ground without undue advantage in age and energy to any community. Table 1 shows details relating to respondents distribution according to the different age brackets in the producing communities and thus confirms the similarity in age distribution.

Table I: Age Distribution in the Peri-urban and typically Rural, Root and Tuber communities in Benue State.

Age Brackets in Years	Type of Community				Total: No. of farmers: %	
	Rural		Peri-Urban		n=208	
	n=104	%	n=104	%		
15-30	42	40.3	42	40.3	84.30	40.3
31-50	37	35.6	38	36.7	75.0	36.1
51-70	23	22.1	22	21.0	45.00	21.6
Above 70	2	2.0	2	2.0	4	2.0
Total	104	100.00	104	100.00	208	100.00

n=the Number of farmers interviewed.

Source: Field Survey 2004.

An analysis of selected socio-economic indicators of productivity like valued output, sales income and average revenue receipt per 100 kilogram of root and tuber sales in the best market varied, within and between groups. Estimated values for peri-urban producer in all cases were remarkably higher than those of the typically rural producer. Details relating to these indicators are presented in table 2. The situation whereby the peri-urban producer is better paid

per unit of root and tuber sales gives him an advantage over his typically rural counterpart, in terms of better earnings and greater capacity to pay for needed goods and services. Further more, most of these needed goods and services are improved seeds, protection chemicals, clothing and energy fuel. These favourably contribute to productivity of the small scale producer and are readily available in urban and peri-urban centres at relatively lower cost. The rural producer therefore receives lesser remuneration for his productivity but pays higher for his investment and daily sustenance. Similarly the typically rural travels longer distances before getting to either laterite or tarred roads for his produce to be finally transported for sale. The typically rural wastes a lot of time and dissipates a lot of energy in commercialization. Most of this energy and time could be saved and channelled into useful productivity in a conducive environment with equal opportunities as the peri-urban root and tuber producer. Prevailing opportunities and means to grab these opportunities are distinctly dichotomized for these two groups of arable farmers in Benue State. The reason for this dichotomy is not far from prevailing micro and macro-economic policies of government in the third world and Benue State in particular that neglect the rural most of the time. The typically rural travels distances (13.1km) to get to points of produce evacuation. This has persisted for long without conscious efforts at micro or macro levels to address the obvious constraint; thus culminating into a limiting effect on the typically rural's ability to alleviate poverty.

Table 2: Estimated output values, sales Income, Revenue Receipt, Life quality score and other indicators of producers.

Item	Rural	Peri-urban	“t” Ratios
Valued output in Naira (₦)'000	111,131	140,671	3.54**
Marketable surplus sales income in (₦)'000	65,413	85,901	13.86**
Average revenue receipt per 100kg output (₦)'000	3,001	12,701	15.158**
Distance to nearest laterite or tarred Road(km)	13.1	1.3	9.839**
Distance to closest urban point of produce sale	7.2	2.91	8.308**
Amount spent on meat weekly in Naira (₦)	817.83	1,085.3	1.72*
Life quality Index (Score)	3.6	4.7	42.092**
Mobility Rating (score)	2.5	8.5	15.358**

** significant at 1% level of analysis

* Significant at 5% level of analysis

Source: Field Survey 2004.

Similarly, amount spent on indicators of good standard of living like weekly meat intake and transportation, recorded lower values for the typically rural. The mean score for quality of life of the peri-urban producer clearly out-weighs the score for the typically rural even at one percent significant level of analysis as in table 2. Thus the expanded programme on Root and Tuber production has resulted to a greater and more meaningful impact on the quality of life of the peri-urban producer. This situation calls for a greater consideration into the infrastructural policy framework of developing economies to check the widening disparity in supported opportunities to the small scale producers.

The discriminant function for poverty alleviation was fitted to analyse causal effect of socio economic indicators on productivity of the small scale producers. This is in line with earlier works of World Bank (1996d) and Blackwood and Lynch (1994). Sales income resulting from marketable surpluses of the two groups of producers were estimated and used as an alleviation score or index. Independent determinants of the alleviation score embraced negative and positive contributors to producers productivity. The estimated discriminant function equation is as presented below. The equation recorded the total discriminant score of 87 percent and an F value of 75.38 as presented in table 3.

$$Y = -0.514x_1 + -0.508x_2 + 0.608x_3 + 0.583x_4 + -0.013x_5 + 0.712x_6 = 0.87$$

- Where
- X_1 = Household kilometer distance to the nearest urban market of produce sale
 - X_2 = Household kilometer distance to nearest tarred road where produce are evacuated
 - X_3 = Marketable surplus values in Naira
 - X_4 = Average price per kilogram root and tuber in the best market of Sales
 - X_5 = The quality of life score of producer
 - X_6 = The mobility score of the producer.

This result was compared using F value for 206 degrees of freedom at 95% significant level. The tabular F value [2.10] was lower than the calculated F (75.384). The result indicates the ability of the fitted function to be significantly different from zero and thus successfully discriminates between typically rural and peri-urban root and tuber producers in Benue State. This result is further confirmed by the high value of the correlation coefficient (0.93) with its squared value (0.865) and the high chi-square value of (326.417), in line with earlier work of Balakrishna and Iyer (1968). Details relating to analysis of variance for the discriminant function is as presented in table 3 below.

Table 3: Analysis of Variance for the Discriminant Function

	Sum of	Degree of	Chi-square	Correlation	F Statistic
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	squares	freedom	95%	coefficient	
Discriminant score	738915.166	6	-	-	-
Residual	314804.989	202	-	-	-
Total	1053720.154	208	326.417	0.93	75.384

Source: Field Survey 2004.

Percentage contribution of each independent variable was analyzed. Details are as presented in table 4 below. Collectively the fitted variables were significant contributors giving total discriminant score of 87%. The highest significant contributor (55%) to poverty alleviation function is linked to marketable surplus sales income (X3) of both categories of respondents. The ability of this variable to alleviate poverty is very much dependant on respondents revenue receipt per unit of root and tuber sales in the market of best sales. Typically rural producers recorded lower receipts (N3001) compared to peri-urban values (N12701). This disparity is due mainly to the fact that most peri-urban producers spent lesser sums on transportation over shorter distances traveled. They also had better bargains for their produce due to better urban demand. Higher incomes would definitely support higher and better quality of life among peri-urban producers and emphasizes the need to improve the rural setting of the rural producer to attract higher demand for his produce and reduce expenditure on transportation for increased net earnings. These will improve his ability for services, goods and better quality of life in general. The second significant contributor to the total discriminant score is the distance covered by producers in kilometres before produce sales in the best market of sales (X₁), with the percentage contribution of 15.2% to the total discriminant score. This variable has a lowering effect on net receipts of typically rural producers, who travelled longer distances. They spent more on transportation and handling charges before sales. Markets and marketing infrastructures available at the door steps of the peri-urban producer most likely avoid excessive cost on his productivity and alleviates poverty more than the typically rural producer.

Table 4: Contribution of Discriminating Variables to the total distance measured with the discriminant function.

Variable	Coefficients	Mean differences	Correlation coefficient	Percentage contribution.
Household distance to nearest urban centre. (X ₁)	-0.54	4.29	-0.498	15.20
Household distance to nearest laterite/tarred road where produce are	-0.508	11.80	-0.265	10.54

evacuated. (X ₂)				
Marketable surplus values in naira. (X ₃)	0.608	20.488	0.493	55.10
Average price receipt per kilogram root and tuber in the best market of sales. (X ₄)	0.583	9.700	0.444	3.05
Quality of life score (index) (X ₅)	-0.013	1.1	0.064	6.10
Mobility score. (X ₆)	0.712	6.0	0.682	5.03

Source: Field survey 2004.

The distance to the nearest point of produce evacuation was estimated as distance to the nearest road, laterite or tarred. This variable contributed significantly to the total discriminant score by 10.5%. Typically rural producers traveled longer distances (13.1km) relative to peri-urban distances (1.3km) in order to evacuate products to markets. Bearing in mind that rural roads are often less motorable and even seasonal, typically rural producers may record losses in product quality having to travel longer distances than the peri-urban producer. Even in the event that the typically rural successfully evacuates products to markets without losses in quality transportation and handling charges must be paid commensurate to geo-spatial distance covered. Obviously, geo-spatial location coupled with high perishability of agricultural produce reduce net earnings and adversely affect poverty alleviation of the typically rural root and tuber producers. Other variables contributing to the discriminant score (Z) were: quality of life score (6%), mobility score (5%), and revenue receipt per unit of root and tuber sale (3%) in that sequence as presented in table 4.

Summary and Conclusion.

This study uses discriminant function to analyse causal effect of poverty alleviation indicators in twenty World Bank beneficiary communities of the expanded programme on root and tuber production in Benue State. Six socio economic variables accounted for 95% valued productivity. Using the fitted discriminant function, the typically rural and peri-urban producers were correctly identified up to 99% with the total discriminant score of 87%. The study found that even though peri-urban and typically rural were alleviated from poverty, there was a distinct dichotomy in the poverty alleviation index/score and valued marketable surpluses of the two

distinct groups. The distinction was due mainly to: sales income from marketable surpluses, distance to nearest urban centres of best revenue receipts and distance to the nearest point of product evacuation for sale. These three variables all favoured the peri-urban producer more than the typically rural. Similarly the three variables accounted for 55%, 15.2% and 10.5% respectively to variability in the function. The study therefore suggests a re-focusing in the micro and macro-economic policy framework of developing economies to provide improved markets and marketing opportunities, improved road network and collection centres that check waste and deterioration in quality of agricultural products. These if addressed will reduce transportation cost, improve income earnings and enhance the ability of the typically rural to alleviate poverty and thus achieve the desired better quality of life in the shortest time.

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