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# URBAN FARMING IN NIGERIA: The Economics of the Participation of Household Labour

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## ABSTRACT

*Urban farming is an emerging phenomenon in Nigerian cities. This study analyses the economic role of the participation of household members in urban farming in Uyo metropolis, Nigeria. Simple proportion, the gross margin analysis and the ordinary least square method were used to analyze the data collected. The results show that an urban farmer could realise ₦15,335.60 per hectare as gross margin. Labour inputs made up 41.9 per cent of the variable cost items while other inputs contributed 58.07 per cent. Most of the urban farming activities were undertaken by adult women. Adult males participated more in land preparation and young males were mainly involved in planting, fertilizer application, and weeding. Hectares of land, labour and fertilizer were more important determinants of urban farm output than other inputs. Efficiency estimates revealed inefficiency in the use of all classes of household labour in urban farms.*

JEL classification: D1, Q14, R14

## 1. Introduction

RAPIDLY growing urban populations and the important roles cities play in national and global economies have in recent years drawn much attention to the cities. One phenomenon, which has attracted the attention of many authorities in urban areas, is urban farming.

Agriculture is primarily a rural activity. This stems from the availability of abundant, fertile cultivable land, and an abundance of rural household labour ready to work to satisfy household food needs. The absence of industries which would have attracted labour from the rural to the urban centres did not exist. Arising from this huge agricultural labour force is the production of food and fibre in large quantities both for the use of rural communities and for export to urban centres, which virtually depended on the rural areas for food supply and raw materials for

industry. This was the situation in most developing countries up to the 1970s and early 1980s.

In Nigeria, agriculture used to be the mainstay of the economy— providing food and employment for the population and raw materials for industry and foreign exchange. All this changed with the discovery and subsequent production of crude oil. The emergence of the oil economy in Nigeria, created visible distortions in the Nigerian economy. First was the emergence of mega cities and boom towns, eg, Port Harcourt, Eket, Warri, etc. These boom towns coupled with the near abandonment of agriculture led to a nearly intractable food crisis, as the young men migrated to the cities in search of jobs. (Umoh and Atobatele, 1995).

Thus, food imports have continued to rise while domestic food prices have continued to soar. For instance the food index was only 22.3 in 1976. This rose to 107.6 in 1986 (12 years later) and 882.5 in 1993 (table 1).

**Table 1. Income, Food Prices and Food Imports in Nigeria (1976 – 1993)**

Year	Food price index (urban) 1985 = 100	Per capita income	Food imports	Deficit in per capita daily calorie intake %
1976	22.3	115.1	441.7	24.93
1977	27.0	1216.28	780.7	27.57
1978	34.1	1099.16	1027.6	30.84
1979	36.5	1097.76	952.2	32.84
1980	40.6	1138.98	1437.5	27.20
1981	52.6	813.07	1819.6	38.0
1982	56.9	790.23	1642.3	33.90
1983	69.7	669.50	1296.7	27.70
1984	101.7	714.23	843.2	26.0
1985	100.0	718.45	940.6	23.0
1986	107.6	697.36	801.9	20.5
1987	113.3	747.55	1646.5	11.5
1988	191.0	782.96	1220.0	15.7
1989	293.8	826.25	2108.9	11.3
1990	303.9	843.94	3474.5	9.1
1991	358.9	847.67	6085.1	9.1
1992	546.4	845.56	12597.2	9.1
1993	882.5	835.67	13912.9	7.76

Sources: i. Ukoha, 1997; ii. Central Bank of Nigeria, *Lagos Statistical Bulletin*, 1998; iii. Central Bank of Nigeria, *Annual Report and Statement of Accounts*, Lagos, 2000.

The food crisis has a greater impact on urban dwellers whose income has not risen in commensurably with the rate of inflation. Again, the downsizing (retrenchment), which was carried out in the public sector (and even private sector) following the adoption of the 1986 structural adjustment programme has worsened the living conditions of urban dwellers. In order to survive in the cities, particularly for those who do not wish to return to their rural communities (return

migration), many city dwellers have 'imported' rural activities to the urban areas. These include agriculture and crafts.

Uyo, the study area, has one of the fastest growing populations in Akwa Ibom State. Consequent upon this increasing population growth, the food needs of the people of Uyo are growing, while the rural area has a declining ability to satisfy these needs. The prices of foodstuff in Uyo are one of the highest in Nigeria. Rapid population growth, deteriorating macroeconomic and social circumstances, and food insecurity in Uyo metropolis have created the conditions that stimulate urban farming. Thus, it is common to see farms on undeveloped plots by the roadside and around dwelling places, etc. Besides satisfying household food needs, it can be assumed that urban farmers are likely to be interested in capturing available urban markets to generate income from their efforts. The questions which arise from these assumptions are: Is urban farming profitable? What factors determine output from urban farms? and how do households allocate available labour to urban farming activities? These questions are the concern of this paper. The paper is divided into five parts: part two presents the theoretical framework, part three, the methodology, part four presents and discusses the results, while part five concludes the paper.

## **2. Theoretical Framework**

This section describes the theory underlying the economics of and labour supply in urban farming.

### **2.1 Economics of Farming**

Agriculture is as old as the very existence of man on earth. It has, however, grown from a stage of food gathering to organized crop and fibre production and livestock rearing, to the current stage of sophisticated technology-driven agriculture. Even in the age of cutting-edge science and technology, agriculture is still faced with several problems, particularly in the developing countries. Olayide and Heady (1982) pointed out that the two global problems of agriculture were namely; under-capacity and over-capacity. They submitted that both are associated with low returns to labour input and are deeply rooted in the resource structure of agriculture. The resource structure is defined as the overall framework of institutional, behavioural and technological relationships that determine resource employment, and hence output, efficiency and income in agriculture.

The basic thrust of the economics of agricultural production at the micro level is to assist individual farmers or groups of farmers to attain their stated objectives through intra-farm allocation of resources over a period of time. Economics of agricultural production is achieved either by maximizing output from a given set of resources or minimizing the resources required for producing a given output. Heady (1960) had emphasized the allocation of resources as a means of achieving

efficiency. By invoking the theory of production, an efficient urban farm firm should concentrate on levels of employment of the factors over which their marginal products are positive but decreasing. This can be represented mathematically thus:

$$MP_x \geq 0$$

where:  $MP_x$  is the marginal product of  $x$ .

If farming by the urban household is aimed at maximizing profit, it will allocate resources at a point where the above condition operates. This is the stage II in the classical production function (fig 1). It is the rational stage of production as any increase in the levels of resources beyond this stage will result in the reduction in total farm output (Koutsoyiannis, 1979). If on the other hand, the farmer is more concerned with satisfying household food needs rather than maximizing profit, efficiency in resources may not be a priority. Thus, the farmer can operate even in the irrational stages of the production function – stages I and III. Should this be the case, then Charyanov's (1966) central concept of labour – consumer balance between the satisfaction of family needs and the drudgery of labour applies. Charyanov submitted that the peasant family tends to proceed with a subjective evaluation that is based on long experience in application. The family will tend to put in a greater effort only if it has reason to believe that such extra labour would yield an increase in output required to meet greater family consumption or for an enlargement of investment in the farm or both.

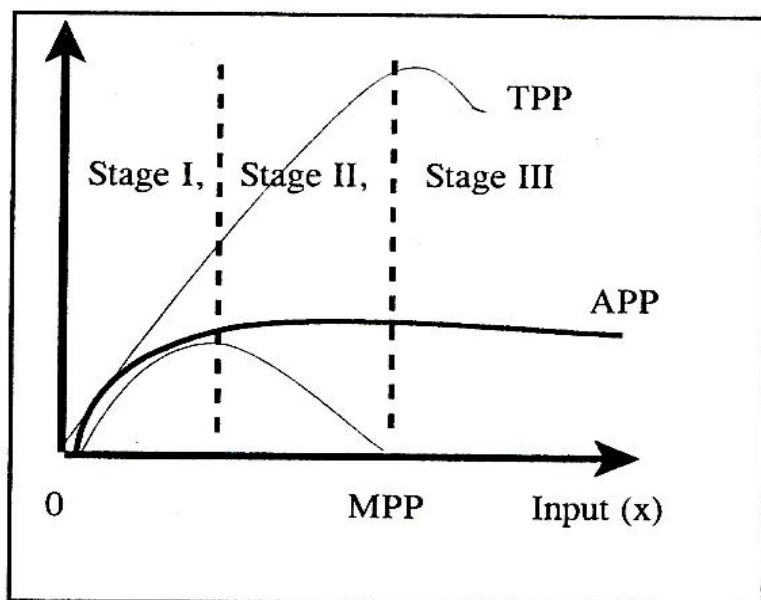


Figure 1. Production function

## 2.2 Household labour allocation

Most household models for Africa have been stated with the assumption that agencies predominate in total employment while the share of formal employment

in most countries is limited (World Bank, 1991). In urban areas, formal employment is expected to predominate. Thus, the household decision should slightly differ from a typical agrarian set up. Grabowski and Shields (1996, 169) supported this view in the following words:

Rapid urbanization is a feature of less developed countries. The pace of this urbanization seems to be quicker in current less developed than in today's developed countries. The cause and implications of this urbanization, as workers shift from agriculture and other rural occupations to urban occupations is a matter of considerable interest for labour economics in less developed countries. There is a substantial difference in wage rates between sectors of the economy such that government employees and employees of large multinational firms, earn substantially more than urban workers in the traditional sector.

Given the existence of both modern and traditional sectors in an urbanizing economy, the neoclassical model of labour supply can readily explain household labour allocation. Like that of consumption, the model is based on utility maximization, subject to a number of constraints (time and budget). An individual's decision to supply labour is assumed to be influenced by two factors: whether or not to work, and in the choice to work, for how long. Socioeconomic variables, individual preferences, and the opportunities available in the market place influence these decisions.

The budget constraint is expressed as a function of goods and leisure where the price of goods is the wage rate, and non-labour income. In the basic neoclassical literature, the only possible uses of time are market work and leisure. As noted by Wamuthenya (2001), this assumption is extreme, particularly for developing countries, as individuals devote a great deal of their time to non-market work (unpaid work). Makonnen (1993) is of the view that this distinction is particularly important in developing countries where market work opportunities are limited and the sources of many goods are from non-market work. Following Wamuthenya (2001) and assuming a single household, the allocation of an individual's time, between market work at home, and leisure can be illustrated in the following equation (note that this is akin to a household member deciding to allocate his or her time to market work, work at home or family farm, or leisure).

$$U = u(G, L) \quad (1)$$

$$G = G_m + G_h \quad (2)$$

$$G_h = f(H) \quad (3)$$

$$G_m = WN + V \quad (4)$$

$$L + H + N = T \quad (5)$$

The set of equations indicates that the individual maximizes utility  $U$ , from the consumption of goods and service  $G$  and leisure  $L$ . Total consumption  $G$  consists of goods bought from the market  $G_m$  and home-produced goods  $G_h$ . Home production is a function of time allocated to it  $H$ . The utility function  $U$ , is maximized, subject to budget constraints in which expenditure on all goods and services from the market is equal to the sum of wages income  $WN$  and non-labour income  $V$ , where  $W$  is the market wage and  $N$  is the time spent on market work. The other constraint states that the total time endowment should equal the sum of leisure time  $L$ , the time spent on home production  $H$ , eg, family farm, and the time spent on market work  $N$ . For optimal time use, the necessary condition is that the marginal rate of substitution between goods and leisure is equal, which in turn equals the shadow price of time. When the shadow price of time equals the real wage rate, the utility optimizing individual supplies positive hours of work as shown in equation 6.

$$[\delta U / \delta L] / [\delta U / \delta G] = \dot{P} = W = W^* \text{P} (N > 0) \quad (6)$$

But when the value of time is greater than the real wage rate, the individual prefers not to participate in market work as shown in equation 7:

$$[\delta U / \delta L] / [\delta U / \delta G] = \dot{P} = W > W^* \text{P} (N > 0) \quad (7)$$

Where  $W^*$  is the shadow price of time,  $W$  is the real wage rate and  $N$  is time spent on market work.

### 3. Research Methods

#### 3.1 The study area: Uyo metropolis

The present Uyo metropolis is the administrative capital of Akwa Ibom State, located in the south east corner of Nigeria's Niger Delta. It has a population of 110,054 (NPC, 1991) and an area of 94.31km<sup>2</sup>. Historically, Uyo was a village of the Offot clan in Ibibioland. It was a military post in 1903. Its agricultural system was similar to that of a typical rural community in southern Nigeria – crop cultivation and livestock rearing. Mixed cropping predominated, with yam, cassava, cocoyam, vegetables and sweet yam the major crops planted. Tree crops such as palm, citrus and African pears were also harvested. The common livestock reared included the West African dwarf goat, sheep, native poultry and small herd of muturu cattle. During the period of colonial rule, especially from 1914, Uyo grew into a commercial centre, as well as the district headquarters of the former Calabar Province in eastern Nigeria. With the reorganization of the province into a division following a Commission of Inquiry recommendations, Uyo became the headquarters of Uyo Division.

Today, Uyo is a typical rural state capital, where beautiful houses are surrounded by cassava and plantain farms.. Adjoining the metropolis are

communities with typical rural characteristics where agriculture is the main livelihood. The population of the state capital fluctuates between day and night as nearly half of those who work in the city during the day return to their villages as the sun sets over the city (Ekong 2001).

Uyo is currently a commercial nerve centre as well as the administrative headquarters of Akwa Ibom State. It is largely a civil service economy with an expanding commercial base and an already recognizable disparity in income. Before the creation of Akwa Ibom State in 1987, Uyo was only a promising commercial town serving the needs of the area then referred to as 'mainland' in the Cross Rivers State.<sup>1</sup> Uyo was and still is a gateway to other important towns such as Abak, Etinan, Eket, Oron, Ikot Ekpene and Calabar due to its central location.

All evidence points to the fact that currently, the rural nature of Uyo is giving way to modernity. The number of modern amenities has increased. For instance, in 2000, Akpan estimated that Uyo had 38 hotels and not less than 20 restaurants. These serve the numerous government officials, most of whom commute on a daily basis between Uyo and the rural offices of local government councils.

Uyo also has an automatic telephone exchange. In the last quarter of 2001, wireless communication also commenced with the launching of ECONET. All these will change the nature of business operations and boost the economy of the state. There has also been an influx of people to the city either to work in offices or to do business. The rural /agricultural character of the town will also be affected in that there will be less land for crop cultivation and livestock rearing. The conduct and structure of marketing will be affected and households will be faced with the dilemma of whether to invest their labour in agriculture or in non-agricultural enterprises.

### **3.2 Data sources and collection methods**

The study employed mainly primary data collected from crop farmers in Uyo metropolis. A structured questionnaire was used to collect the data, supplemented with focussed group discussions (FGD).

First, Uyo metropolis was divided into two areas with the central commercial centre ('Ibom connection' or circus) as the point of reference. A simple random sampling of 50 crop farmers from each area was carried out. The interview process consisted of meeting and interviewing farmers on the farm, particularly, in the evenings and weekends when most of the respondents were on their farms. The questionnaires were left with the literate farmers to complete and an agreed date fixed for their collection. The non-literate respondents were interviewed and

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<sup>1</sup> South Eastern State became Cross Rivers State in 1976, before Akwa Ibom was carved out of it in 1987.



the responses filled into the questionnaire. In all, 100 questionnaires were administered, 50 in each of the two areas. In order to cross check the responses of individual respondents and to gather qualitative data, four focussed group discussions (FGD) were held with farmers. Between 5 and 10 farmers were invited to a discussion in an interactive atmosphere (often those in the farms). The researcher introduced the topics and the discussion was tape recorded with the permission of the participants, and later transcribed to ensure that the ideas of the people were not wrongly presented or forgotten.

**3.3 Methods of analysis**

The data collected were analyzed using descriptive statistics-simple proportions and percentage, and the results presented in stylized form. The relationship between farm level resources and outputs were determined using the ordinary least square method. This method was also used to examine the relationship between urban farm outputs and labour inputs. The Cobb-Douglas (double-log) production function was used. The Cobb-Douglas function is one of the most widely used functions in economic analysis of problems relating to the empirical estimation in agriculture and industry (Shankhayan, 1988). The algebraic form of this function with many inputs is:

$$y = a_0 X_1^{a_1} X_2^{a_2} \dots X_n^{a_n} \tag{8}$$

where,  $y$  and  $X_i$  ( $i = 1, 2, \dots, n$ ) are the levels of output and inputs respectively. The constants  $a_0$  and  $a_i$  ( $i = 1, 2, \dots, n$ ) represent the efficiency parameter and the production elasticities of the respective input variables. The estimating form of the equation is:

$$Lny = Lna_0 + \sum a_i Lnx_i; i = 1, 2, \dots, n \tag{9}$$

For the Cobb-Douglas function; the average product with respect to the input ( $AP_i$ ) at given levels of all other inputs is derived as;

$$AP_i = y/x_i \tag{10}$$

The marginal product with respect to the input  $MP_i$  at some levels of all other inputs is derived by taking the first order partial derivative of ? with respect to  $x_i$

ie,  $\frac{dy}{dx_i} = MP_i = a_i X_i^{a_i-1} a_0 X_1^{a_1} X_2^{a_2} \dots dx_i X_{i-1}^{a_{i-1}} X_{i+1}^{a_{i+1}} \dots X_n^{a_n} = a_i X_i^{-1} a_0 X_1^{a_1} X_2^{a_2} \dots X_n^{a_n} = a_i X_i^{-1} y = a_i y/x_i$  (11)

The linearized forms of the Cobb-Douglas function used are as stated:

EQUATION 1: For output and farm level resources:

$$L_n y_i = L_n b_0 + b_1 L_n LB_i + b_2 L_n LD_i + b_3 L_n FE_i + b_4 L_n IR_i + b_5 L_n SD_i + U_i \tag{12}$$

where:

- $y_i$  = crop output (in grains equivalent)
- $LB_i$  = labour used by farmer; (in mandays)
- $LD_i$  = land used by farmer; (in hectares)
- $FE_i$  = fertilizer used by farmer  $i$  (in kg)
- $IR_i$  = irrigation used by farmer  $i$  (water in litres)
- $SD_i$  = seeds used by farmer  $i$  (in grains equivalent)
- $bo$  = constant term
- $b_1, b_2, b_3, b_4, b_5,$  = coefficients of the variables;
- $U_i$  = error term

All the coefficients should be positively signed .

EQUATION II: For output and labour input:

$$L_n y = L_n b_0 + b_1 L_n AML + b_2 L_n AFL + b_3 L_n MCL + b_4 L_n FCL + b_5 L_n F_s + FS + b_6 L_n FE + U_i \quad (13)$$

Where:

- $y_i$  = crop output (in grains equivalent)
- $AML$  = adult male labour (in mandays)
- $AFL$  = adult female labour (1  $AFL$  = 1 man day)
- $MCL$  = male child labour (1  $MCL$  =  $\frac{1}{2}$  man day)
- $FCL$  = female child labour (1  $FCL$  =  $\frac{1}{2}$  man day)
- $FS$  = farm size (in hectares)
- $FE$  = fertilizer use (dummy: 1 if fertilizer is used, 0 otherwise)
- $Uc$  = error term
- $b_0$  = constant term  $b_1, b_2, b_3, b_4, b_5, b_6$  = coefficients of the independent variables  $X_1$  to  $X_6$ .

All the coefficients are expected to be positively signed.

From the production function, the conventional neoclassical test of economic efficiency was derived. The rule for this test is that the slope of the production function  $MPP$  is equal to the inverse ratio of input price to output price at the profit maximization point. For labour this is given as:

$$MPP_{LB} = \frac{P_{LB}}{P} \quad (14)$$

Where:

- $P_{LB}$  = the price per man day of labour
- $P$  = the output price
- $MPPL_B$  = the marginal physical product of labour
- $MVP_{LB} = K$

Where:

- $MVP_{LB}$  = marginal value product of labour

$K$  = numerical constant

Efficiency is attained if  $MVP = MFC$

Where:  $MFC$  = marginal factor cost

#### 4. Results and Discussion

##### 4.1 Household members' participation in urban farming

Extant literature characterizes urban areas as regions of industrial and service activities, while the rural areas are identified with agricultural production. The practice of agriculture in urban centres pre-supposes the co-existence of rural and urban activities side by side, within the same vicinity. If it is assumed that these activities are carried out by the same set of people, then it is plausible to submit that the participation of individual or members of household may be affected.

Table 2 presents the participation of household members in cultural activities involved in crop production. It was assumed that gender and generation could influence the involvement of household members in urban agriculture, hence, respondents were asked to rank the participation of men and women, and children (both girls and boys) in terms of very high, high, low and very low.

**Table 2. Level of Household Members' Participation in Urban Farming**

Farming activity	Ranking of participation by household members			
	Adult male	Adult female	Male child	Female child
Land clearing	Very high	High	High	Very low
Land preparation (excluding clearing)	Very high	High	High	Very low
Plam	Low	Very high	Very low	High
Fertilizer application	Low	High	Very low	High
Weeding	Very low	Very high	Low	High
Harvesting	Low	Very high	Very low	Low
Marketing	Very low	Very high	Very low	Very low

This and the divisions of labour indicated in the results are suggestive of the subsistence nature of urban farming in Uyo. Adesimi (1981:16) had earlier noted that:

Within the context of subsistence agriculture, the division of labour tends to be identified with status and social structure. There is first of all division by sex and age: men clear ridge or heap the land while women help in harvesting and carrying head loads; children perform progressively more tedious tasks as they grow older.

In this case study, however, women were doing more than ‘helping in planting, harvesting and carrying head loads’, they also participated in land preparation, implying that they are assuming more tedious tasks. It is obvious from the results that adult females dominated in all crop cultivation activities. Their participation was ranked very high in weeding, harvesting and marketing and high in other activities. Adult male participation was ranked very high in land preparation activities but very low in weeding and marketing. Male children seemed to be only involved in land preparation activities including land clearing while female children were ranked to be highly involved in planting, fertilizer application and weeding. Some studies, for example Odii, (1994) reported the dominant role of women in agriculture in Africa. The results obtained in this study confirm that this situation holds even in urban agriculture. This is the case with both adults and children as female children were ranked to highly participate in three of the seven activities listed whereas male children were identified to be involved in only two. The implication of this is that women may continue to play a more dominant role in agriculture since the female children who participated more than the male children are likely to grow up more experienced and interested in farming than the male children.

The reasons why some household members participated more than others are presented in table 3. In activities which relied mainly on physical fitness, adult males and female and male children dominated. Involvement in other activities was determined by the availability of time and thus adult females and female children dominated. That physical fitness is a major determinant of labour participation in urban farming suggests that the operations in this enterprise depended on physical strength and human energy rather than on machines.

**Table 3. Reasons for the Disparity in Household Members’ Participation in Urban Farming**

Activity	Most involved household member	Most important reasons
Land clearing	Adult female, adult male	Physical fitness
Land preparation (excluding land clearing)	Adult male, female; male child	Physical fitness
Planting	Adult female, female child	Availability of time
Fertilizer application	Adult female, female child	Experience
Weeding	Adult female	Experience/availability of time
Harvesting	Adult female, female child	Availability of time
Marketing	Adult female	Availability of time

Source: Field Survey, 2001.

#### **4.2 Profitability of urban farming**

Analyses of economic efficiency are typically based on the assumptions that farmers strive to maximize profits given competitive input and output markets. Following this assumption, this study employed gross margin analysis to assess the profitability of urban farming in Uyo metropolis. The results are presented in table

4. The cost items are grouped into two – labour items and others. The labour items include: land clearing, weeding and harvesting while the others included farm fertilizer, irrigation (water), seeds and land (rentage). Labour items made up about 42 per cent of the total variable cost. Of these, weeding and land clearing constituted 17 per cent of the total variable cost, respectively. The other items put together made up 58.07 per cent of the operational cost. The operational cost incurred on an average hectare of urban farmland was ₦29,618.00 while the gross margin was ₦15,335.00. The small gross margin realised could be due to the small and fragmented nature of urban farms in the study area that prevented farmers from reaping the economies of scale. It is obvious from the findings of the study that the gross margin that accrued from one hectare of urban farm was meagre and could not sustain a farming household, particularly, as the cost of living in Uyo is very high (mean household expenditure was estimated as ₦3972.01 in 1996), (FOS 1999). This assertion is valid given that the farmer has to wait for one cropping season, which for some crops may take up to one calendar year, only to realize ₦15,335.60 as the gross margin from his/her enterprise. It could be inferred from this that urban farming will continue, (as field observation reveals), as a side business, until such a time that it can generate income high enough to keep a family comfortable.

**Table 4. Average Cost and Return per Hectare on an Urban Farm**

Cost items	Average cost (₦)	Per cent of total
<b>A. Labour items:</b>		
i. Land clearing	4800	16.21
ii. Weeding	5050	17.05
iii. Harvesting	2568	8.6
Total i-iii	12418	41.93
<b>B. Others</b>		
iv. Fertilizer	3920	13.24
v. Irrigation (water)	1720	5.81
vi. Seeds	4840	16.34
vii. Land	6720	22.69
Total iv-vii	17200	58.07
Average variable cost	29618	100.00
Total revenue	44,953.60	
Gross margin	15,335.60	

Source: Field survey (2001).

### 4.3 Determinants of crop output in urban farming

Table 5 presents the regression results and shows the farm inputs that determine crop output in urban farming. The  $R^2$  value indicates that all the farm resources put together – labour, land, fertilizer, irrigation (quantity of water) and seeds account for 54 per cent of the variation in output. The coefficients of labour, land and fertilizer are positively signed, thus conforming to a priori expectations. The

coefficients of irrigation and seeds are, however, negatively signed. Labour is significant at one (1) per cent while land and fertilizer are significant at 5 per cent. Irrigation and seeds have negative and insignificant effects on crop output. The implication here is that an increase in the quantities of these inputs will reduce the crop output. The possible explanation for this could be that farmers do not need to apply the quantity of water or use the quantity of seeds as at present. They need to reduce these inputs if the level of output is to improve.

#### 4.4 Labour determinant of crop output in urban farming

In order to ascertain which category of household labour influences farm output, a regression equation of the Cobb-Douglas function was estimated. Among the four categories of household labour considered, adult male and adult female labour were significant at five per cent level. The results in a way confirm what was earlier reported in table 2, which revealed the dominance of adult male and female in urban farming in the study area. The hectares of land also turned out to be significant (1 per cent level). The coefficients of all the variables were positive, which shows that they were positively related to crop output. Collectively, the various categories of labour, farm size and fertilizer explained 65 per cent of the variation in crop output. The results obtained from this analysis confirm the importance of the different categories of household labour, size of farm and fertilizer in raising the output level in urban farming.

**Table 5. Determinants of Output from Urban Farming (regression result: double log)**

Variable	Coefficient	t - Statistic
Constant term	3.995	3.997***
Labour (LB)	0.345	2.373**
Land (LD)	0.1422	2.497**
Fertilizer (FE)	0.322	4.054***
Irrigation (IR)	-5.70	-0.629
Seeds (SD)	-2.53	-0.361
R <sup>2</sup> = 0.54		
F - Value = 3.47***		

Source: Computed from field data, 2001.

**Table 6. Labour Determinant of Crop Output in Urban Farming (regression results)**

Variable	Coefficient	t - statistic
Constant term	0.689	0.715
Adult male labour	0.131	2.0147***
Adult female labour	0.242	2.051**
Male child labour	0.0164	0.183
Female child labour	0.138	1.775
Land (farm size)	0.685	3.084***
Fertilizer (dummy)	.192	0.545
R <sup>2</sup> = 0.65		
F-statistic 4.11**		

Source: Computed from field survey, 2001.

#### 4.5 Efficient use of resources in urban farming

The concept of efficiency is at the core of economic theory. The theory of production economics is concerned with optimization, and optimization implies efficiency (Baumol, 1977). Land and labour-time properly represent the dominant household resources, which have to be allocated to several competing activities. The results in table 7 show the efficiency parameters of the farm inputs used in crop production in urban farms in Uyo metropolis.

All the efficiency estimates indicated that the urban crop farmers were not efficient in the use of any of the resources. The ratios of the marginal value product *MVP* to marginal factor cost (*MFC*) did not indicate any appreciable gain in the use of any of the resources. For every ₦1.00 invested in labour, land, and fertilizer, ₦0.09, ₦0.007 and ₦0.54 were realised respectively. Investment in water for irrigation and seeds actually reduced the revenue that accrued to the urban farmer as indicated by the negative values of marginal physical product, marginal value product and the ratio of *MVP* to *MFC* (ie,  $d/y$ ). The average physical product *APP* was the total quantity of output produced per unit of input used. Marginal physical product *MPP* was the additional output obtained from an extra unit of output used (ie,  $dy/dx$ ).

**Table 7. Efficiency Parameters**

Resource	<i>APP</i>	<i>MPP</i>	<i>MVP</i>	<i>MFC</i>	<i>MVP/MFC</i>
Labour	10.77	0.345	27.6	300	0.09
Land	28.98	0.1422	11.38	1500	0.007
Fertilizer	21.20	0.322	25.76	48	0.54
Irrigation	70.71	-5.70	-456.00	0.34	-1341.18
Seeds	17.20	-2.53	-202.4	00	-2.53
Unit output price (grain equivalent) = ₦80/kg					

*Source:* Computed from regression results.

Marginal value product (or value of marginal product) *MVP* is the product of *MPP* and unit output price, say  $P_y$ . (ie.  $MVP = MPP \cdot P_y$ ); Marginal factor cost is the unit price of an input used in the production process.

Estimates of efficient use of labour do not show that there was an efficient use of all categories of household labour, neither was there efficient use of land or fertilizers (table 8). The values of the *MPP* only revealed marginal gains in the use of these resources. This was also reflected in the ratio of *MVP* to *MFC*. A ratio greater than 1 would mean gains (efficiency) in the use of a given resource, and at least a break even position in resource use.

Almost in all cases, the unit price of labour was higher than its *MVP*. This points, generally, to an inefficient use of resources in urban farming. This contradicts the profit maximizing behaviour as propounded by other neoclassical

models of farmer behaviour, implying that other objectives, eg, food satisfaction suggested by Olayide and Heady (1982) could be paramount in urban farming.

**Table 8. Estimates of Efficiency Parameters**

Resource	APP	MPP	MVP	MFC	MVP/MFC
Adult male labour	5.00	0.131	10.48	3.00	0.03
Adult female labour	13.86	0.242	19.36	300	0.06
Male child labour	51.40	0.0164	1.31	200	0.007
Female child labour	62.54	0.138	11.04	200	0.06
Land	73.01	0.685	54.8	1500	0.04
Fertilizer	50.54	0.192	15.36	48	0.32
Unit output price (grain equivalent) = ₦80/kg					

## 5. Conclusion

The present study provides an insight into the emerging phenomenon of farming in the urban areas and cities of Nigeria. The study set out to investigate the profitability and participation of household members in urban farming. We used Uyo, a developing urban centre as a case study. The study revealed that as in subsistence farming, labour was the major constituent among the variables for the cost production. The gross margin that could accrue to a farmer from one hectare of food crops was about double the government's current (2005) monthly minimum wage (₦7,500.00). Labour and farm size were found to positively and significantly influence farm output, while water (irrigation) and seeds were negatively related to crop output. Adult male and female labour were the types of labour that determined farm output. However, farmers were inefficient in the use of farm resources.

What are the implications of these results? First, urban farming will continue mostly at the subsistence level, depending largely on family labour unless those factors, which perpetuate this, are removed. Such factors may include but are not limited to inadequate land arising from either unfavourable indigenous tenural arrangements, or the inability of the farmer to purchase enough land for farming due to low income.

Second, since farmers were found to be inefficient in the use of resources, it may mean that increased output and productivity may be difficult to achieve. High input cost and low or non-commensurate output prices might be responsible for this outcome. The findings generally point to the challenge that faces the increased productivity and self-food sufficiency campaigns of the Nigerian government. The solution to the problems identified lies in addressing the issues responsible for the present situation in a holistic and determined manner.



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