Journal of Agriculture and Sustainability
ISSN 2201-4357
Volume 8, Number 2, 2015, 29-42

Land-Income-Nutrition Nexus: Implication for Food Security of Rural Households in Nigeria

Oladapo Olusesan and Olajide O. Adeola

Department of Agricultural Economics,
University of Ibadan, Ibadan, Oyo-State, Nigeria

Corresponding author: Oladapo Olusesan, Department of Agricultural Economics, University of Ibadan, Ibadan, Oyo-State, Nigeria

Abstract: The produce cultivated by farm families are consumed and or sold in the market to generate cash which is used to meet other household needs. But the farm families also have to make food purchases at higher prices to supplement the short fall that may have occurred over time. This presents a Land-Income-Nutrition cycle; the study investigates the interplay of this nexus with socio-economic characteristics of farm families. A multi-stage random sampling technique was used to select a total of 74 farm families from villages. The data collected were analyzed using descriptive statistics and multiple regression analysis. The results show that farming and related activities (poultry production) are the major sources of income. Land use in the area consists mainly of sole cropping, mixed cropping, crop rotation. Average monthly income from farming is ₦27,135.00, and ₦17454.04 is spent on food monthly. The per caput calorie intake shows a short fall of 1353.33Kcal less than the international recommendations. The regression analysis shows that family size, income, food expenditure and source of farm land influence the daily calorie intake of farm families; the influence is not necessarily direct or linear. Improved market access through good roads and improved post harvest technology are recommended.

Keywords: Resource, Nutrition, Sustainability, Households

INTRODUCTION

Food is a basic necessity of life. Adequate food intake, in terms of quantity and quality, is a key for healthy and productive life because it affects our ability to survive, thrive and learn (Ayantoye, K. *et al*, 2011). As such it is imperative to make every man, woman and child free from hunger and malnutrition. Nigeria's appalling food insecurity situation has degenerated to a level that it is listed among the 42 countries tagged "low-income food deficit countries" (WB 2003; Ayantoye, K. *et al*, 2011). Food insecurity disproportionately affects rural people particularly rural women, minorities and children (Ayantoye, K. et al, 2011). Studies (World Bank, 2003;Ayantoye, K. et al, 2011) have revealed that rural people face a high risk of food insecurity due to poverty, income inadequacies, limited access to resources (land), underemployment, and unemployment, and many barriers to self-sufficiency, which create family frailty and crisis. This translates to inadequacy of income to support the provision of the basic needs of man (food, clothing and shelter).

Rural families depend largely on land. But the continuous use of the land for agricultural activities coupled with climatic changes, soil erosion and continued expansion of population has led to its scarcity. Invariably, crop and livestock production patterns are being changed to suit what is available. This could lead to a compromise in meeting the family's nutritional needs as well as the quality of food items produced Adebayo, 2010). In spite of the progress made in improving nutrient availability in the last decade, a large proportion of poor households in developing countries still have inadequate access to sufficient food (Abdulai and Aubert, 2004). Although per capita daily calorie intake in developing countries has increased substantially in the last decade, the number of undernourished people is high and

recent food price increases has also triggered an increase in hunger (Pimentel d and A. Wilson, 2004).

Income is generated from farm and off farm sources. The portion generated from farm outputs makes the role played by the availability of land and its use very important. It influences what is produced for consumption and what can be produced for sales so that cash can be generated for other household expenses. Such expenditure also includes the purchase of food items to supplement the farm supply shortage or non produced items such as beverages. The distribution of income within a community is usually unequal (Oluwatayo, 2008) because of the differential use of resources and ability to take up opportunities for higher income.This study examines the relationship between rural household nutrition, income and land ownership by investigating the influence of income distribution and land-use on the calorie supply to households.

METHODOLOGY

Study Area

The study was carried out at Akinyele Local Government Area (LGA); the LGA isbounded by Afijio Local Government to the north, Lagelu Local Government Area to the east, Ido Local Government Area to the west and Ibadan North Local Government Area to the south. It occupies a land area of 464.892 square kilometers with a population density of 516 persons per square kilometer. Using 3.2 percent growth rate from 2006 census figures, the 2010 estimated population for the Local Government is 239,745. The area is characterized by two seasons: The dry and wet seasons. The LGA has between 100cm to 200cm of annual rainfall and a constantly high temperature of 24^0C to 27^0C. The area is endowed with a wide expanse of land for the production of livestock and

arable farming. About half of the area is rural in nature. The main crops cultivated are maize, cassava, yams, cocoa, oil palm, vegetables and citrus fruits. The most common type of farming in the LGA is subsistence agriculture. The soil is very fertile but marshy especially along the river valleys. The soils are mainly sandy and loamy; deep and able to sustain both food and cash crops. These facts coupled with a large population of subsistent farmers makes the study area suitable for the investigation of the research question.

Sources of Data and Sampling Procedure

Primary and Secondary data were used. Primary data were collected through the use of structured questionnaire in oral interview. Secondary sources of data on the land-use, land productivity, food production and food security at different points in time relating to Oyo state, Ibadan and Akinyele LGA were obtained from international organizations such as the United Nations Development Program (UNDP), and local organizations such as Oyo State Agricultural Development Program (OYSADEP), Akinyele LGA's Department of Agriculture, and The State Ministry of Agriculture, Natural Resources and Rural Development. The study focused on rural settlements. Eight villages were randomly chosen from a list of 15; the chosen ones are Mele, Falao, Balogun, Laniba, Labode, Aroro, Mogaji and Idi-Omo. Sequel to this, a total of 74 farmers were randomly selected in such a way that the sample drawn from a particular village is proportional to its size.

MultipleRegression Model

Implicit form: $Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, E_i)$

The forms of the regression model estimated are explicitly presented below:

Linear:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + \ldots b_9X_9 + E_i$$

Exponential:

$$\mathbf{LnY} = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + \ldots b_9X_9 + E_i$$

Semi-log:

$$Y = b_0 + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 + b_7\ln X_7 + \ldots b_9\ln X_9 + E_i$$

Double-log:

$$\ln Y = b_0 + b_1\ln X_1 + b_2\ln X_2 + b_3\ln X_3 + b_4\ln X_4 + b_5\ln X_5 + b_6\ln X_6 + b_7\ln X_7 + \ldots b_9\ln X_9 + E_i$$

Y = Per caput calorie intake by rural households.

X_1 = Household size

X_2 = Educational status

X_3 = Household income per week in Naira

X_4 = Weekly expenditure on food in Naira

X_5 = Total farmland size under cultivation measured in Acres

X_6 = Use of fertilizers

X_7 = Use of chemical

X_8 = Sources of farmland

X_9 = Cropping system

E_i=Error term.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Farmers

The results show that farming is dominated by male farmers; female farmers constitute 9.5 percent of the sample. Additional information gathered from the respondents showed that male farmers engage in various farming activities; cultivating the soil for different crops while most times the wives/women were responsible for processing farm produce into other consumable forms. Also, female farmers are characterized with small farmland size, and most of them augment their income through other means of livelihood, usually trading. About 90.5 percent of the sampled farmers' fall between the ages of 30 – 69 years. The average age being 48.12 years, it implies that majority of the farmers are in the active labour age. Relatively due to the fact that majority of the farmers sampled are middle aged, correspondingly, 81.1 percent are married. Married farmers have more dependants on the household income compared to single farmers. About 45 percent have no formal education, 35.1 percent claimed to have schooled up to the primary stage and none of the sampled farmers have tertiary education. This has an implication on the nutritional knowledge of the farmers, adoption of innovation and modern cultural practices (Table 1).

Household Land Resource Use

Sources of Farmland

Land represents a major resource in agricultural production. Together with labor, land is one of the most important inputs in agriculture. The way and manner a farmer acquires his land gives one an impression of what he is permitted to do with such a land with respect to the types of crops to be grown. It was observed that 54.1 percent own their farmland through inheritance only, this set of farmers explained that farmland is being handed over from one generation to the succeeding one, and as time passed by, family size enlarge and available farmland is being shared amongst family members resulting in land fragmentation (Table 2). The data reveals that 35.14 percent

of the sample has between 0.5 acres and 3.0 acres; 3.1 acres – 7.0 acres were owned by 20.27 percent of the respondents. A small fraction (22.97 percent) of the total sampled farmers has total farmland sizes of more than 11.0 acres. 21.62 percent however fell within the range of 7.1 acres to 11.0 acres (Table 2).

The Quantity Harvested and the Quantity Consumed of Own Produce

Farmers engage in crop production for a number of reasons. Mainly, they do so for household consumption and income generation through sales. Cassava is a farm produce in great demand by individuals, households and industries. Individuals and households place demand on Cassava for immediate dietary consumption, Industries do so for further processing into well packaged products/goods such as Laundry Starch, Gari, Bread, etc. The percentage of the aggregate quantity consumed of the total harvested quantity of Cassava is 22.10 percent. Banana records a high percentage of quantity consumed (59.22 percent) for the mere fact that it can consumed raw. So, in times of perpetual hunger, it is quite convenient to consume, thereby suppressing the hunger. Amaranth, Corchorus, Tomato, Celosia, Pepper, and most especially Ugu have very low percentage of their quantities consumed by the farmers. Although, farmers start to harvest them as soon as they attain maturity, they sell off and give out to members of the community in order to reduce wastage. Due to the lack of proper storage facilities, farmers cannot keep these food items for a long period of time or else they will get bad and become totally useless (Table 3).

Frequency of Daily Meals

Most of the respondents claim to eat regularly (table 4). This however does not imply that the diet is as balanced or nutritious as expected. This is because the calorie intake is

derived mainly from what is produced by the household and centers around Yam, Cassava, Maize and complementing food items. The estimated average daily per caput calorie intake for a cassava based meal is 724 Kcal; for a maize based meal is 46.35kcal and for a Yam based meal is 376.39Kcal. If it is assumed that the daily meals consist of these different items, then the total calorie consumed by an adult member of the family is 1146.67 Kcal. This value is less than the recommended 2500Kcal by WHO

Income Distribution

The disparity in household income of the sample is large owing to the differences in the amount of income realized by individual households. The table shows that the highest frequency of 37 out of 74 belongs to income group ₦5000 -₦7500 per week, followed by income group ₦ 2500 -₦5000 per week with frequency of 18 (Table 5).

Relationship betweenLand, Income and Nutrition

From the four functional forms fitted to the data, the exponential function was chosen as the lead equation because of its highest value of R^2 and F ratio. The nutrition values are derived mainly from household farm production and represent calorie supply to the farm family.The value of the coefficient of determination R^2 of the result was 0.562 and this is significant at 5 per cent level. The implication of this is that in the selected model, about 56.2 percent of the variability of the daily per caput caloric intake was explained by the independent variables in the model. The value of the overall significance, F-value is statistically significant at 5 per cent level. The results show that several socio-economic variables could improve the rate of daily calories supply to the household but the significant ones are household size and increased weekly income;could be decreased by weekly expenditure on food. This could be because increased food expenditure implies a reduced dependence on own production and what may be

purchased is not necessarily sufficient. The source of land is also significant implying that ownership and non secured rights on land do not translate to land use efficiency (Table 6).

CONCLUSION AND POLICY RECOMMENDATION

Income of rural households, the size of households and the sources of farmland are found to be important factors that determine the level of calorie intake by rural household members.Although the population will keep expanding, the existing lands can be optimally utilized through efficient use of farming inputs and technology, and the marginal lands abandoned due to their characteristic low productivity could be reclaimed for agricultural expansion hereby contributing to the overall food output made available for consumption. The empirical findings of this research have clearly revealed that Nigerian's lingering nutritional backwardness has not only steaed out of low income earning and population pressure but also on the inefficiency of land-use Appropriate policy measures must therefore be put in place to solve this protracted issue of malnutrition with a wholesome approach of agricultural resource-use efficiency. A policy to enhance creation of efficient production and market infrastructures and improved land access policy are required.

References

[1] Abdulai, A. & Aubert, D. (2004). Nonparametric and Parametric Analysis of Calorie Consumption in Tanzania. *Food Policy,*29, 113-129

[2] Adebayo S. Bamire (2010); "Effects of tenure and land use factors on food security among rural households in the dry Savannas of Nigeria" *African Journal of Food, Agriculture, Nutrition and Development*. March, 2010.

[3] Ayantoye, K, S.A Yusuf ,B.T Omonona and J.O Amao (2011); "Food Insecurity Dynamics and its Correlates among Rural Households in South-Western Nigeria" *International Journal of Agricultural Economics and Rural Development – 4(1): 2011.*

[4] Oluwatayo I.B. (2008); "Explaining Inequality and Welfare Status of Households in Rural Nigeria: Evidence from Ekiti State" *Humanity & Social Sciences Journal 3 (1): 70-80, 2008.*ISSN 1818-4960. IDOSI Publications, 2008

[5] Pimentel D. and A. Wilson (2004); *World Population, Agriculture and Malnutrition,* College of agriculture and Life Sciences, Cornell University. *http:/www.worldwatch.org/pubs/mag/*

[6] World Bank, (2003). "2002 Development Indicators" Washington D. C.: World Bank Pages 74-75.

Table 1: Socio-Economic Characteristics of Farmers

Gender	Frequency (N=74)	percent of Total	Cumulative percent
Male	67	90.5	90.5
Female	7	9.5	100
Age			
20 – 29	4	5.4	5.4
30 – 39	12	16.2	21.6
40 – 49	26	35.1	56.7
50 – 59	16	21.6	78.3
60 – 69	13	17.6	95.9
70 – 80	3	4.1	100
Marital Status			
Single	14	18.9	18.9
Married	60	81.1	100
Educational Level			
No formal education	33	44.6	44.6
Primary school	26	35.1	79.7
Secondary school	15	20.3	100
Tertiary institution	-	-	-
Farming Experience			
5 – 15	24	32.4	32.4
16 – 25	18	24.3	56.7
26 – 35	15	20.3	77.0
36 – 45	11	14.9	91.9
46 – 55	5	6.8	98.7
56 – 65	1	1.4	100

Table 2: Mode of Farm Land Acquisition and Farm Size

Item	Frequency (n=74)	Percentage
Mode of farmland acquisition		
Inheritance only	40	54.1
Purchase + Inheritance	10	13.6
Lease/Rent only	10	13.5
Borrowing only	10	13.5
Lease + Borrowing	4	5.4
Farmland size in acres		
0.5 – 3.0	26	35.14
3.1 – 7.0	15	20.27
7.1 – 11.0	16	21.62
11.1 – 15.0	6	8.10
15.1 – 19.0	3	4.05
19.1 – 21.0	4	5.41
21.1 – 25	4	5.41

(1 Acre = 0.4047 Hectare: 2½ Acres = 1 Hectare)

Table 3: Crops Cultivated, Quantity Harvested and Quantity Consumed

Crops Grown	Quantity Harvested	Quantity Consumed	Percentage Consumed
Cassava (measured in tubers)	292800	64700	22.10
Maize (measured in ears)	86900	29350	33.78
Yam (measured in tubers)	19250	8300	43.12
Cocoyam (measured in tubers)	7750	3700	47.74
Banana (measured in bunches)	255	151	59.22
Amaranth (measured in heads)	270	108	40.00
Corchorus (measured in heads)	141	43.5	30.85
Pepper (measured in baskets)	360	74	20.56
Tomato (measured in baskets)	136	30	22.06
Celosia (measured in heads)	179	25	13.97

Table 4: Average Daily Meal Intake

Number of Meals per day	Frequency (N-74)	Percentage
0	0	0
1	0	0
2	1	1.35
2 or 3	28	37.84
3	45	60.81
4	0	0

Table 5: Distribution of Farmer's Household Income per Month

Income group (per week)	Frequency (N=74)	Total monthly income in each category (₦)	percent of Total monthly income in each category	Cumulative percent within each category
< 2500	2	16000	0.8	0.8
2500 < 5000	18	260000	13.0	13.8
5000 < 7500	37	878000	43.7	57.5
7500 < 10000	8	262000	13.1	70.6
10000 < 12500	7	316000	15.7	86.3
22500 < 25000	1	96000	4.8	91.1
> 42500	1	180000	8.9	100
Total		2008000		

Table 6: Regression Analysis Results

	Coefficient	T-values
Constant	16.28	0.000*
Household Size	2.191	0.033**
Educational Level	-1.319	0.193
Household income per week	2.142	0.037**
Food Expenditure per week	-2.336	0.023**
Farm Size	1.067	0.0291
Use of Fertilizer	-1.104	0.275
Use of Chemicals	-1.192	0.239
Source of Farm land	-3.754	0.000*
Cropping System	0.836	0.407

R^2 =0.56 Adjusted; R^2 = 0.49; F = 7.55 *t-value significant at 1 percent; **t-value significant at 5 percent