

# Analysis of the Effect of Farm Labour Supply on Food Crop Production in Nasarawa State, Nigeria

Ojo A.O., Usman N.M. and Ojo M.A.

Department of Agricultural Economics and Extension Technology,  
Federal University of Technology, Minna

*Nigerian Journal of Agricultural Extension, Vol. 19, Number 3, September 2018*

## Abstract

*Labour supply is a critical factor of production in a developing economy. But over the years, there has been reduction in labour supply in Nigeria due to massive emigration of youths to urban areas. This has critically affected food production output, such that domestic supply cannot meet up with demand of about 180 million people in the country. Therefore, this study investigated the effect of farm labour supply on food crop production in Nasarawa State, Nigeria. Primary data sources were used to elicit information from 120 food crop farmers selected using a 3-stage sampling procedure. Analytical techniques employed included descriptive statistics, ordinary least square regression and likert attitudinal scale model. The results revealed that there was very low level of family labour participation in farming activities; thus, hired labour was the main source of labour supply in the area. In addition, labour supply had significant effect on the output of food crop farmers who operated at an increasing return to scale during the production period. Moreover, labour supply, farm size, capital input, fertilizer application and socioeconomic factors such as educational level, health status and farm income significantly affected food crop production in the area. It was recommended that there should be policy framework directed at revitalizing rural communities for increased farm labour supply, especially among youths through the provision of functional social amenities in the area.*

**Keywords:** Migration, labour supply, return to scale

## Introduction

Agriculture is the mainstay of the Nigerian economy and is responsible for the domestic supply of food and fibre for the entire populace with few imports to augment the shortfall in their supply. It is also a fundamental instrument for economic growth, sustainable development, poverty reduction and enhanced food security in developing countries like Nigeria (Yisa, 2015). The labour force comprises of people ages 15 and older who meet the International Labour Organization's definition of the economically active population who supply labour (human effort) to produce goods and services during a specified period (NBS, 2016). The term 'farm labour supply' refers to the number of people who are willing and available for farm operations. In rural areas, labour is a

major component of factors of production which could be in form of family, hired, exchange or communal labour.

The importance of labour in Nigerian agricultural system cannot be overemphasized because according to Olayide (2002), over 90% of production systems in the country depend on human labour and even for mechanized agriculture, about 50 to 60 percent of the tasks depend on human labour. But of all the different forms of labour, hired labour constitutes the largest percentage of total labour supply for food production due to the near absence of youth in their energetic and economically active age in different family units. Moreover, many of the farmers do not view farming as a profession of pride that could be handed over to their offspring. They detest the

drudgery attached to farming and as such prefer to send their wards to the city for a better and more fulfilling future. This opinion and action of the farmers coupled with socioeconomic, environmental and political factors have led to reduced labour supply in the rural families through rural-urban migration of the youths to the cities where there is easy access to basic necessities of life, social amenities and white collar jobs.

This development implied that food crop production is left in the hands of dependants who could hardly cope with the enormous task embedded in production, processing and distribution of food crops. This has serious implications on food production system as it leads to decline in aggregate output and income of the farmers; reduction in cost effectiveness of food crop production, increased food insecurity and poverty among the rural folks, as well as slow economic growth. In addition, it has increased the congestion and competition for facilities in the urban areas. In the event that these youths' high expectation of city life is dashed, it could increase the menace of political thuggery, currency forgery, kidnapping, ritual killing, terrorism, assault, drug addiction/trafficking, cyber-crimes, hired assassination and armed robbery. Therefore, given the importance of the labour supply in Nigerian agriculture and the grave implications of inadequate labour supply in farming communities, the study is aimed at determining the effect of labour supply on food crop production in the study area while the outcome of the study is expected to aid policymakers in formulation of policies that will positively impact on the rural lives and engender alternatives to labour supply in the study area.

### **Methodology**

The study was conducted in some local government areas (LGAs) of Nasarawa State. It was created on 1st October 1996 from old Plateau State with its headquarters at Lafia. Geographically, the State is located between latitude 8°22'N

and 11° 30'N, longitude 33° N and 7° 20'E, bounded in the north by Kaduna State, in the west by Federal Capital Territory Abuja, in the south by Kogi and Benue States and in the east by Taraba and Plateau States. It has a land area of area of 27,117km<sup>2</sup> and projected population is 2,640,112 in 2016 at the growth rate of 2.5%. The maximum temperature is recorded between March and June at 34°C, while the minimum temperature is from December to January at 26°C, respectively. The State has 13 LGAs and has agriculture as the predominant occupation. The main crops grown include yam, cassava, cowpea, maize, guinea corn, oil palm, millet, mango, rice and orange throughout the year. It is also known for its solid minerals such as salt and bauxite barite.

The sampling selection involved the use of a 3-stage sampling technique. The first stage involved the simple random selection of Wamba and Akwanga Local Government Areas (LGAs) from the 13 LGAs in the State. The second stage was a simple random selection of 5 towns/villages from the selected LGAs. The third stage involved the random selection of 12 farmers from each town/village making a total of 120 farmers selected for the study.

Data for this study were on 2016 production season and obtained from primary sources using a structured questionnaire to elicit relevant information from the farmers with the assistance of trained enumerators. Some of the information collected included socio-economic variables such as age and educational level; production factors such as farm size and labour supply; age distribution pattern and, constraints facing the food crop farmers in the area. Four crops were selected for this study. The selected food crops used for the purpose of this study were aggregated with the use of grain equivalent table. Each of these crops were selected from three classes of food, namely, pulses (cowpea), cereal (rice and maize) and root and tubers (yam).

The analytical techniques involved descriptive statistics and ordinary least

squares regression. The multiple regression model was used to determine the effect of farm labour supply on food crop production. The explicit form of the regression equation is as expressed in equation 1 as:

$$Y = b_0 + b_1X_1 + b_2 + b_2X_2 + b_3 + b_3X_3 + b_4 + b_4X_4 + b_5 + b_5X_5 + b_6 + b_6X_6 + b_7 + b_7X_7 + b_8 + b_8X_8 + b_9 + b_9X_9 + b_{10} + b_{10}X_{10} + e_i \quad (1)$$

Where

Y = Food crops output (kg) (grain equivalent table was used for the aggregate)

X<sub>1</sub> = Farm size (Ha)

X<sub>2</sub> = Planting materials (₦)

X<sub>3</sub> = Farm labour supply (man days)

X<sub>4</sub> = Fertilizer (kg)

X<sub>5</sub> = Agrochemicals (litres)

X<sub>6</sub> = Capital input (depreciation value)

X<sub>7</sub> = Gender (male = 1, 0 otherwise)

X<sub>8</sub> = Level of education (years)

X<sub>9</sub> = Health status (₦)

X<sub>10</sub> = Farm income (₦)

The 4-point Likert Attitudinal Scale (LAS) model was used to determine the various constraints that confronted the food crop farmers in the area. The model entails defining a scale of statement that mirrors the respondents' perception towards an underlying variable and establishing a score reflecting a quantitative measurement of the perception of each farmer. Respondents were asked to respond appropriately to a list of different constraints statements such as poor market for food crop output and prevalence of pests and diseases. Their responses were scored on a four-point scale: very severe agree (4), severe (3), undecided (2), not severe (1). The summation of these values was 10 which was then divided by 4 to obtain 2.5, taken as the cut-off mean. The aggregated scores on the indicators of the type of constraints provided a basis for classification of farmers' perception into major or minor constraints. Constraints with mean score of less than < 2.5 was taken as minor constraints while those greater than or equal to ≥ 2.5 were assumed to be major constraints faced by the farmers in the area.

## Results and Discussion

### Occupations of respondents

The distribution of farmers according to their primary and secondary occupation was presented in Table 1. The result shows that farming as a major occupation stood at about 64.9%. This was followed by trading at 16.2%, artisanal at 9.9% and, agro-processing at 6.3% which ranked 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup>, respectively. The result also shows that 0.9% of the farmers engaged in civil service as a major occupation which confirmed the assertion that the study area is an agrarian community with a face of poverty and low standard of living which characterize the rural communities in developing countries like Nigeria. The result of the secondary data showed that civil service, farming and artisanal ranked 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup>, respectively which showed that food crop farmers had diversified income sources as security against crop failure due to climatic, edaphic and environmental factors.

### Age distribution pattern of food crop farmers' households in the area

The age distribution of the farmers' households and the number involved in agriculture were as presented in Table 2. The findings revealed that out of the 471 members of households, only 168 (35.7%) of them participated in farming activities. The ages of the farmers' households were grouped into four namely, Children (< 10 years), youths (10-19 years), adults (20-60 years) and aged (>60). The result showed that all the groups were dominated by male gender. Since the adults were the majority in the food farmers' households, it was expected that large households with low dependants would contribute immensely to the productivity and household food security of the food crop farmers through off-farm and on-the-farm production, processing and distributional activities. The low level of family labour supply for food crop production is also reflected in the Table which confirmed the high usage of hired labour for food crop production because of limited availability

of family labour participation in most farming activities.

Furthermore, adult category of those who participated in farming activities revealed that male gender dominated labour supply at 32.7% when compared to the female gender at 12.5%, which confirmed that there was lower level of female gender participation due to socio-economic, cultural and religious inclination of the farmers. The dependants (children and the aged) constituted about 28% of the farmers' households. If food crop production is left in the hands of these dependants it would have serious implications not only on the household but on the entire country such as increase in food import to meet the demand of the teeming populace. Generally, the result corroborates the report of Tocco et al. (2015) that men are generally more active in the labour market and predominantly in agricultural decision-making than women who are assumed to specialize in child care and family responsibilities. Iwayemi and Olusoji (2013) studied women's labour supply in Nigeria and reported that women's labour force participation rates depend on age, education, ethnic origin, income, religion and relationship to the household head.

#### **Sources of farm labour supply to the food crop farmers**

Farm labour supply can be in form of family, hired, communal or exchange labour. As shown in Table 3, Hired labour supply ranked first at 64%. This was followed by communal, family and exchange labour at 15.3%, 10.8% and 10%, respectively. This implied that hired labour was the major source of labour utilized by the farmers in the study area. Most of the farmers engaged in traditional agriculture which is characterized by drudgery and very low per capita income and as such would prefer out-migration of their household members (especially their children) to cities so as to acquire formal education for a better tomorrow. In the same vein but contrary to *a priori* expectation, majority of the farmers did not source their labour supply from

exchange and communal arrangement probably because of risk and uncertainties about the future such as ill health, accidents as well as selfishness and unfaithfulness on the part of the farmer's counterpart. This agrees with the study conducted by Mbah et al., 2016 on the effects of rural-urban youth migration on farm families in Benue State, Nigeria and reported that the major causes of rural-urban youth migration included inadequate employment, opportunities in rural areas ( $M=3.6$ ), search for better education ( $M=3.5$ ), inadequate social infrastructure such as schools, poor medical care services in rural areas, looking for money through labour and apprenticeship programme. The result is at variance with that of Akinola (2014) in a study conducted on factors affecting farm labour supply for food crop production in Niger State, Nigeria who reported that the main source of labour in the area was family labour while hired labour and mechanized labour ranked 2<sup>nd</sup> and 3<sup>rd</sup>, respectively.

#### **Effect of farm labour supply on food crop production in the study area**

The result of the effect of farm labour supply on food crop production was presented in Table 4. In order to obtain a result that best determined the effect of farm labour supply on food production, various functional forms of Ordinary Least Square Regression analysis were tried and the best functional form was selected based on statistical, economical and econometrical considerations.

The double log functional form was chosen as the lead equation on the basis of its  $R^2$ , the explanatory power and number of significant variables as well as the F-ratio. The F-ratio of 93.29 showed that the entire model was significant at  $p < 0.01$  and that the explanatory variables jointly predicted the variations in output. The  $R^2$  of 0.8705 showed that 87% of the variation in the output of food crops was explained by the included explanatory variables. The analysis revealed that farm size, labour supply, educational level and farm income were all positive and

significant at  $p < 0.01$  significant level while capital input, health status and fertilizer application were also significant at  $p < 0.05$ ,  $p < 0.05$  and  $p < 0.10$ , respectively which showed that a 1% change (increase) in any of these variables led to more than 1% change (increase) in the output of the sampled food crop farmers in the area. This result is in conformity with the a priori expectation that the more of these variables supplied into food crop production, the higher the output level and vice versa. This result corroborates that of Anyiro (2013) who carried out a study on labour-use efficiency by smallholder yam farmers in Abia State, Nigeria and reported that the quantity of harvested yam, size of cleared farmland and quantity of fertilizer applied significantly affected the amount of labour used in yam production at 10.0%, 5.0% and 1.0% level of significance respectively. This result is at variance with the finding of Akinola (2014) that labour supply was not a determinant of food crop production in the State but that determinants were farm size, capital inputs and fertilizer. Ibitoye (2009) observed that there was a positive relationship between farm size and agricultural production in Yagba Area of Kogi State, Nigeria.

The elasticity of production for Cobb-Douglas function is the summation of the coefficients and measures the response of output to changes in inputs. This helps in the determination of the nature of return to scale in production. The result in Table 5 reveals that the elasticity of production was greater than 1 (601.84) which implied that the food crop farmers operated at an increasing return to scale, that is, increases in farm size, labour supply and depreciation on capital input by the same proportion resulted into more than proportionate change in output of the crop farmers in the study area. This could occur when there is prevalence of external economies of scale which could have resulted in reduction in cost of food crop production in the area.

### **Food crop farmers' perception on the constraints to production**

Most farmers in developing economies of the world have diverse constraints militating against the maximization of full cost principle goal of farmers. The study focused on the perception of the farmers about these constraints and the result revealed that the major constraints (Table 6) militating against them included but not limited to poor transport network, pest and diseases, poor market for their output and inadequate storage facilities which ranked 1st, 2nd, 3rd and 4th with weighted mean score of 2.91, 2.61, 2.59 and 2.47, respectively. Good road network is needed for easy movement of output from the farm to the areas where there are market potentials for the commodity.

When roads are bad, the cost of transportation would increase leading to increased cost of production. In the same vein, problem of pests and diseases reduce the quality, market value and viability of farm output; poor market for farm products implied that farmers did not get the expected remuneration for their products which could discourage them from further production in the future; inadequate storage facilities lead to a lot of wastages, loss in market value of farm products, increase in the prices of the products during offseason and increase the exploitative tendencies of speculative middlemen. All these constraints characterized peasant agriculture in most underdeveloped and developing economy like Nigeria. The minor constraints included limited access to land, devastation by fire outbreak, late arrival of inputs leading to untimely farm operations, poor yield, flooding and drought which ranked 8th, 9th, 10th, 11th, 12th and 13th, respectively. This result is in consonance with that of Ojo et al. (2014) in a paper titled 'analysis of household labour-use in yam production in Benue State, Nigeria' who reported that the main household labour use constraints were inadequate farm inputs and lack of relevant information.

### Conclusion and Recommendations

The study assessed the effect of farm labour supply on food crop production in Wamba and Akwanga Local Government Areas of Nasarawa State, Nigeria. The results revealed that most of farmers engaged in secondary occupation as a mean of income diversification in case of crop failures. The age distribution of the farmers' households revealed the male gender dominance over their female counterpart with very low level of family labour participation in farming activities thus, hired labour was the main source of labour supply in the area. The analysis also revealed that farm size, labour supply, educational level and farm income were all positive and significant at  $P < 0.01$  alpha level while capital input, health status and fertilizer application were also significant at  $p < 0.05$ ,  $p < 0.05$  and  $p < 0.10$  alpha levels, respectively. In addition, the food crop farmers operated at an increasing return to scale during the production period. The perceived major constraints against food production included poor transport network, prevalence of pest and diseases, poor market for their output, inadequate storage facilities insufficient capital, high cost of input and poor extension services.

Based on the finding of the study, the following recommendations are made:

1. Policy framework directed to the revitalization of the rural communities for increased farm labour supply especially among youths through the provision of functional social amenities in the area.
2. Conscious effort of increasing commercialization of agriculture by all tiers of government so as to reduce the drudgery of farming and hence make it more appealing to the youths
3. Community leaders should encourage farmers to form cooperative society which could help to create more market outlets for their output.
4. Government should also focus on rural road construction to enhance the transportation of food crops from the rural areas to urban areas.

### References

- Ajibefun, I.A. and Daramola A.G. (2003). *Determinants of Technical and Allocative Efficiency of Microenterprises: Firm-level evidence from Nigeria*. African Development Bank, Cote d'Ivoire.
- Akinola, A. (2014). Factors affecting farm labour supply for food crop production in Niger State, Nigeria. MTech thesis, Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria.
- Anyiro, C.O. (2013). Labour-use efficiency by smallholder yam farmers in Abia State Nigeria: A labour-use requirement frontier approach. *International Journal of Food and Agricultural Economics*, 1(1): 151-163.
- Ibitoye, S.J. (2009). A survey of land acquisition method for agricultural production in Yagba area of Kogi State. *International Journal of Agricultural Economics, Management and Development* 1(1) 128-134.
- Iwayemi, A. and Olusoji, M.O. (2013). Women's labour supply in Nigeria: An econometric analysis. *IOSR Journal of Humanities and Social Science*, 8(6), 41-51.
- Mbah, E.N., Ezeano C.I. and Agada M.O. (2016). Effects of rural-urban youth migration on farm families in Benue State, Nigeria. *International Journal of Agricultural Research Innovation and Technology*, 6 (1): 14-20
- National Bureau of Statistics (NBS) (2016). *Annual Abstracts of Statistics*, 1: 65-98.
- Ojo, A.O., Eneji S.O., Ojo M.A. and Ogaji A. (2014). Analysis of household labour-use in yam production: The case of Benue State, Nigeria. *Journal of Agriculture and Agricultural Technology*, 5(1): 22 – 26.
- Olayide, M.C. (2002). Technical efficiency and productivity of maize producers within and outside the global, 2000 projects. *Agricultural Economics*, 19 (3): 341-348.
- Tocco, B., Bailey A., Davidova S. and Raimond V. (2015). Women and part-time farming: understanding labour supply decisions in Italian farm households. A paper at the International Conference of Agricultural Economists, 8-14 August, Milan, Italy.
- Yisa E.S. (2015). Analysis of production and productivity of arable crop farmers in north-central Nigeria. PhD thesis, Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria.

**Table 1: Occupational distribution of food crop farmers**

<i>Variables</i>	<i>Frequency</i>	<i>Percentage (%)</i>	<i>Rank</i>
<b>Primary</b>			
Farming	72	64.9	1 <sup>st</sup>
Trading	18	16.2	2 <sup>nd</sup>
Craft-making	11	9.9	3 <sup>rd</sup>
Agro-processing	7	6.3	4 <sup>th</sup>
Others	2	1.8	5 <sup>th</sup>
Civil Service	1	0.9	6 <sup>th</sup>
<b>Secondary</b>			
Civil service	41	36.9	1 <sup>st</sup>
Farming	40	36.0	2 <sup>nd</sup>
Craft-making	13	11.7	3 <sup>rd</sup>
Agro-processing	7	6.3	4 <sup>th</sup>
“	7	6.3	4 <sup>th</sup>
Others	3	2.7	6 <sup>th</sup>

**Table 2: Age distribution pattern of the farmers' households**

<i>Variables</i>	<i>Frequency</i>		<i>Percentage</i>	
	<i>Male</i>	<i>Female</i>	<i>Male</i>	<i>Female</i>
<b>Age distribution in the households</b>				
Children (< 10)	70	52	14.9	11.0
Youths (10-19)	65	55	13.8	11.7
Adults (20-60)	120	67	25.5	14.2
Aged (> 60)	25	17	5.3	3.6
Total	280	191	59.5	40.5
Total No. of households	471			
<b>Age distribution of those involved in farming activities</b>				
Children (< 10)	7	5	4.2	3.0
Youths (10-18)	19	26	11.3	15.5
Adults (20-60)	55	21	32.7	12.5
Aged (> 60)	21	14	12.5	8.3
Total	102	66	60.7	39.3
Total No. of households involved in farming activities	168			

**Table 3: Sources of farm labour supply**

<i>Sources</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Rank</i>
<b>Hired</b>			
Yes	71	64.0	1 <sup>st</sup>
No	40	36.0	
<b>Communal</b>			
Yes	17	15.3	2 <sup>nd</sup>
No	94	84.7	
<b>Family</b>			
Yes	12	10.8	3 <sup>rd</sup>
No	99	89.2	
<b>Exchange</b>			
Yes	11	9.9	4 <sup>th</sup>
No	100	90.1	

**Table 4: Effect of farm labour supply on food crop production**

<i>Independent variables</i>	<i>Linear</i>	<i>Semi-log</i>	<i>Exponential</i>	<i>Double log</i>
Constant (a)	-1580.372 (-0.26)	-820.9485 (-1.15)	6.523366 (27.15) ***	6.79776 (33.90) ***
Farm size	2625.6 (8.37) ***	1952.818 (11.11) ***	0.6691187 (11.29) ***	328.96 (3.46) ***
Planting materials	425.574 (-0.96)	-0.0076249 (-0.82)	7.26e-07 (-0.23)	3.83e-06 (1.52)
Labour supply	1038.54 (0.98)	0.000909 (0.303)	1.02e-06 (1.10)	4.98e-06 (3.34) ***
Fertilizer	-11.32811 (-0.26)	3904359 (1.84) *	0.00006 (3.51) ***	0.0014583 (1.70)*
Agrochemicals	5.940919 (2.26) **	1.123826 (3.60) ***	4.98e-06 (3.34) ***	0.0000289 (1.07)
Capital input	285.5659 (0.85)	-0.0047683 (-1.29)	0.0019051 (0.31)	272.88 (2.63) **
Gender	289.3319 (0.81)	7.467391 (0.41)	0.341955 (0.99)	0.345068 (0.96)
Educational level	-578.4976 (-0.54)	85.57539 (0.83)	-0.000128 (-0.69)	5.79e-06 (4.77) ***
Health status	5915116 (1.86) *	0.198938 (0.36)	3904359 (1.84) *	383.73 (2.87) **
Farm income	-45.51095 (-1.32)	0.1477533 (2.29) **	-3.35e-06 (-2.68) **	1264793 (4.96) ***
R <sup>2</sup>	0.62	0.76	0.78	0.87
F-value	10.25***	20.23***	22.50	93.29***
Adjusted R <sup>2</sup>	0.56	0.72	0.74	0.86

Figures in parenthesis are t-values; \*, \*\* and \*\*\* means significance at 10%, 5% & 1% respectively

**Table 5: Elasticity of food crop production in the study area**

<i>Variables</i>	<i>Coefficients</i>	<i>Nature of Return to Scale</i>
Farm size	328.960000	
Labour supply	0.000498	
Capital input (depreciation)	272.880000	Increasing Return to Scale
Summation of coefficients	601.840498	

**Table 6: Constraints encountered by farmers in food crop production**

<i>Constraints</i>	<i>Weighted Score</i>	<i>Weighted Mean</i>	<i>Rank</i>	<i>Decision</i>
Poor transport network	323	2.91	1 <sup>st</sup>	Major
Prevalence of Pest and diseases	289	2.60	2 <sup>nd</sup>	Major
Poor market for output	287	2.59	3 <sup>rd</sup>	Major
Inadequate storage	275	2.47	4 <sup>th</sup>	Major
Insufficient capital	268	2.41	5 <sup>th</sup>	Major
High input cost	266	2.40	6 <sup>th</sup>	Major
Poor extension services	232	2.32	7 <sup>th</sup>	Major
Limited access to land	245	2.21	8 <sup>th</sup>	Minor
Devastation by fire outbreak	245	2.21	9 <sup>th</sup>	Minor
Late arrival of input/loan	243	2.19	10 <sup>th</sup>	Minor
Poor yield	241	2.17	11 <sup>th</sup>	Minor
Flooding	236	2.13	12 <sup>th</sup>	Minor
Drought	199	1.79	13 <sup>th</sup>	Minor