AGRICULTURAL LABOUR PRODUCTIVITY GROWTH AND FOOD INSECURITY TRANSITIONS AMONG MAIZE FARMING HOUSEHOLDS IN RURAL NIGERIA

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ARTICLE INFO

Original Article

Received: *06 September 2022*

Accepted: *01 December 2022*

doi:10.5937/ekoPolj2204093A

UDC
338.439.053.3:631.11(669)

Keywords:

Labour productivity growth; Chronic food insecurity; Transitory food insecurity; Rural; Nigeria

***JEL**: D24, J24, O15, O47*

ABSTRACT

Agriculture in rural Nigeria is labour-intensive. Thus, the much-desired transition from food insecurity to food security by householdsrequires growth in labour productivity. Labour productivity growth and its effect among other factors on food security transitions of maize farming households in rural Nigeria were assessed. Food insecurity indices were constructed using the second and third waves of data from the General Household Survey-Panel (2012 and 2015), and a probabilistic model was specified. The analytical tools used were descriptive statistics, Partial factor (labour) productivity, Foster-Greer-Thorbecke Model, Markov chain model, Tobit, and Multinomial Logit Regression Models. Labour productivity increased between the two periods although labour productivity growth was very low. Labour productivity growth negatively and significantly affected the transition into food security and being chronically food insecure. Thus, a boost for labour productivity growth should be targeted as a safetynet, especially for the food insecure and households vulnerable to food insecurity.

Introduction

Globally, aboutone-third of theworld's labour force is employed by the agricultural sector. Neither men nor women who work as agricultural labourers own or rent the land where they do their work, as well as the tools and equipment they employ(FIAN International, 2014; ILOSTAT, 2022). Therefore, in many regions of the world, a significantfractionof them are food insecure and comprise the rural poor (World Bank, 2022).It is a fact that adequate quantity and quality of food is a basic need for food security and hence food insecurity affects rural farmers' ability to survive, thrive and

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sustain life. Food insecurity thus poses a clear, substantial threat to our society's well-being given the myriad of negative consequences linked with hunger.

While household food insecurity is described as a scenario where access to or consumption of food is uncertain, insufficient, or unavailable, food security is defined as "a situation in which all individuals at all times have physical and economic access to sufficient, safe, and nutritious food which fits their dietary needs and food choices for an active and healthy life"(FAO, 1996; Aboaba*et al.,*2020; Obayelu *et al*., 2021). In other words, a household is food insecure when it is unable to buy or have access to the amount and quality of food necessary for a healthy lifestyle (Obayelu and Orosile 2015). Due to an increase in the number of malnourished people in the world in recent years, the majority of global conversations have continued to centre on hunger and food security(Ayinde *et al.,* 2020). In 2021, 20.2% of Africans were considered to be undernourished, compared to 9.1% in Asia, 8.6% in Latin America and the Caribbean, 5.8% in Oceania, and less than 2.5 per cent in Northern America and Europe(FAO, IFAD, UNICEF, WFP and WHO, 2022).

In Nigeria's rural areas, where a higher proportion of smallholder farming households reside and operate their farms, food insecurity and hunger are major concerns. The benefits of increasing food production have not resulted in a higher proportion of the population being food secure in the nation. (Otekunrin *et al.,* 2019;2021). Small-scale farmers, who control the nation's food production experience socioeconomic and institutional limitations that reduce their productivity (Oyebanjo *et al.,* 2015) and even though rural households which are primarily made up of farmers grow and sell crops in markets, they nevertheless struggle with food insecurity and hunger (Nkegbe, 2017; Ogunniyi *et al*. 2018)

Agricultural labour productivity is correlated with food insecurity because lower agricultural labour productivity would result in a smaller food supply, higher food costs, lower farm income, and ultimately reduced buying power to meet other needs for achieving household food security(Squires and Gaur, 2020). Moreso, it isbelieved that sub-Saharan Africa's agricultural productivity, particularly in Nigeria, may be constrained by the inefficient use of hired and family labour, which will have a significant impact on farming households' food security. This is becauseNigerian agricultureis labour-intensive andstill largely supported by small-scale resource-limited farmers who live in the country's rural areas. Although the sector has a lot of human resources, its contribution to economic growth has been declining over time (Manyong et al., 2005; Mohammed-Lawal and Omotesho, 2010).In other words, the low productivity has been attributed to the fact that the sector is primarily made up of small-scale farmers who still employ primitive production techniques, making them heavily dependent on manual labour and maintaining their level of production at a subsistence level(Gocowski and Oduwole, 2003; Oluyole *et al*., 2013; Anyaegbunam *et al.,*2010).

Several causes, including but not limited to migration, the desire for a better education than what is provided in rural areas, the prevention of child labour, and the search for white-collar work, have contributed to a recent trend of a declining family labour

supply.The success of the International Labor Organization in preventing child labour, along with growing recognition of the value of education even in rural regions, has raised the percentage of children enrolled in schools, limiting the amount of time available for farm work (Diallo *et al*., 2013). The demand for an alternate source of farm power, such as hired labour, to meet households' needs for food security is growing even though family labour is most sought by peasants due to its lower transaction cost. That is, in order to make the highly desired shift from small-scale farming, which is typically defined by food insecurity, to a commercial level of output (status of food-secure households) through an increase of production resources, extra labour must be outsourced. This is especially important when family labour is insufficient to ensure high levels of food security for farming households.

Given the connection between low labour productivity and food poverty, there is a significant likelihood that Nigeria's agricultural labour productivity will be constrained by inadequate utilisation of labour. The relationship between rising labour productivity and changes in food insecurity, however, has not gotten much attention. Thus, this study aims at highlighting the link between labour productivity growth and food insecurity transitions among maize farmers in Nigeria. This is pertinent as incomefrom growth in labour productivity has great implications for the affordability of food and by extensionmovements into and out of food insecurity.Maize farmers were chosen because maize(Zea Mays) is one of the crops in the highest demand in the world. In addition to beingamajor staple food for families in Nigeria and a key constituent of livestock feeds, it has other varying industrial uses(ThriveAgric,2021).Given the foregoing, it is imperative to provide empirical support for the relationship between rising labour productivity and changes in food insecurity among maize farming households in rural Nigeria.

Materials and methods

The scope of this study is Nigeria. Nigeria is located in West Africa, the Gulf of Guinea between the Republic of Benin and Cameroun and is positioned between latitudes $4^0 1^{`}$ and $13^0 9^{`}$Nand longitudes $2^0 2^{`}$ and 14030' E. Its 923,777 square kilometre area is bordered to the east by Cameroun, the northeast by Chad, the north by the Niger Republic, and the west by the Benin Republic. It is made up of 774 Local Government Areas and 36 federating states, including the Federal Capital Territory (Abuja) (LGAs). With a population of roughly 219,463,862 and a rural population of about 99,033,580, Nigeria is the most populated country in Africa (Central Intelligence Agency, 2022). Approximately 90% of those living in rural areas work in agriculture. The GHS-Panel data for the second and third waves of surveys, which were gathered in February–April 2013 and 2015, respectively, through cooperation between the National Bureau of Statistics (NBS) and the World Bank Living Standard Measurement Study (LSMS) team, served as secondary data for this study (NBS, 2014; 2016). Because these were the most recent data available at the time of this investigation, the second and third waves were utilised. The information, which was gathered from a sample of 5000 households, is nationally representative and includes details about household characteristics, literacy

rates, on- and off-farm income-generating activities, paid and unpaid employment, agricultural practices and output, labour, household food expenditure, wage rates, and farm characteristics. The data also provides enough information to assist the researcher to respond to important study issues, and it is representative of both rural and urban areas as well as all of the country's geopolitical zones.The analytical techniques used in this investigation were descriptive statistics, the Food Insecurity Index, Tobit and Multinomial Regression models, and the Markov Chain model. Frequencies, percentages, and tables were utilised as descriptive tools, and the Food Insecurity Index, which was calculated as the ratio of each household's per capita food spending to the mean per capita expenditure, was used to categorize households according to their level of food security. As a result, households classified as food-secure had per capita food expenditures that were greater than or equal to two-thirds of the mean per capita monthly food expenditure for households, while households classified as food insecure had per capita food expenditures that were lower than that threshold.

The ratio of labour output (Y) to labour input (L) is known as labour productivity (L). It is a partial indicator of productivity that is heavily reliant on the efficient utilisation of other inputs (Schreyer, 2001). Labour productivity (y_p) is expressed as:

$$_{p} = \frac{\text{volume measure of output}}{\text{Measure of labour input}} = \frac{Y}{L} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

or

$$y_p = \frac{\text{total revenue of maize farmed at time t}}{\text{cost of labour used by maize farmers at time t}} = \frac{Y}{L} \ldots\ldots\ldots\ldots\ldots \quad (2)$$

Tobit regression was used to examinethe factors influencing labour productivity growth among maize farming households in rural Nigeria. The explicit form of the regression model is stated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_{11} X_{11} + \beta_{12} X_{12} + U \ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where Y = Labour Productivity Growth

X_1 = Age of farmers (years),

X_2 = Education level (years of schooling),

X_3 = Household size (number)

X_4 = Marital status (Yes=1 if married, 0 if otherwise)

X_5 = Member of cooperative society (Yes =1; 0 if otherwise)

X_6 = Extension visits (number),

X_7 = Access to credit (Yes =1; 0 if otherwise),

X_8 = Household food expenditure (₦)

X_9 = Gender (Male =1, 0 if otherwise)

X_{10} = Dependency ratio (number)

X_{11} = Value of assets (Naira)

X_{12} = Farm size (Ha)

B_0 = constant term,

$\beta_1 - \beta_{12}$ = regression coefficients of independent variables, and U = Error term.

A Multinomial Logit model was used to examine the effects of labour productivity growth on food insecurity transitions of maize farming households in rural Nigeria. Considering a random variable Y_i that takes one of several discrete values, which is index 1, 2, 3….., *J*. in this study, Y_i is the food insecurity transitions categories and it takes the values 'Always food secure', 'Entering food insecurity', Exiting food insecurity, and 'Chronically food insecure, which are indexed 0, 1, 2, 3.According to the model, there is a chance that every person will fit into one of the categories. Since the household categories 0, 1, 2, 3 … ,j are unordered, the most preferred way to relate π_i to covariates is through a set of j* - 1 baseline-category logits. Taking j* as the baseline category, the model is

$$\text{Log}\left(\frac{\pi ij}{\pi ij*}\right) = \chi_i^T \beta j, \quad j \neq j* \ldots\ldots\ldots\ldots\ldots\ldots \quad \ldots\ldots (4)$$

The baseline-category probability (Yi = j* (0) can be written as:

$$\pi_{i0} = \frac{1}{1+\sum j=1 \exp(\chi_i^T \beta j)} \ldots. \qquad . (5)$$

Following Adepoju (2012)and Ayantoye (2011), the multinomial logit regression model can be expressed explicitly as

$Y_0 = \alpha_0 + \beta_{10}X_1 + \beta_{20}X_2 + \ldots\ldots\ldots\ldots + \beta_{n0}X_n + \varepsilon_{i0}$ ……(6)

$Y_1 = \alpha_1 + \beta_{11}X_1 + \beta_{21}X_2 + \ldots\ldots\ldots\ldots + \beta_{n1}X_n + \varepsilon_{i0}$ ……(7)

$Y_2 = \alpha_2 + \beta_{12}X_1 + \beta_{22}X_2 + \ldots\ldots\ldots\ldots + \beta_{n2}X_n + \varepsilon_{i0}$ …… (8)

$Y_3 = \alpha_3 + \beta_{13}X_1 + \beta_{23}X_2 + \ldots\ldots\ldots\ldots + \beta_{n3}X_n + \varepsilon_{i0}$ …… (9)

Where Yi represents 4 unordered categories of food insecurity transition:

Y_0 = Always food secure in both waves (which is the reference case)

Y_1 = those who were food secure in the first, but food insecure in the second wave (i.e.) transitorily food insecure).

Y_2 = those who were food insecure in the first wave, but food secure in the second wave (i.e. transitorily food insecure).

Y_3 = those who were food insecure in both waves (chronically food insecure)

X_1… Xn representvector of the explanatory variables where n = 1….12

$B_1 \ldots \beta_{12}$ represent the parameter coefficients

εi = representsthe independently distributed error terms

$\alpha_{0\_} \alpha_3$ = shows the intercept or constant terms.

Results and discussion

According to this study,more than four-fifths (85.3%) of maize farming households in rural Nigeria are male-headed, implying that agriculture is still predominantly dominated bymales. The distribution of the respondents with respect to age indicates that most rural household heads were between ages 46 and 65 years with a mean age of 52.8 ± 14.2 years.Household sizes of between 6 and 10 members, were predominant while the average household size stood at about 8 members per household.While more than four-fifths (81.7%) of maize farming households heads in rural Nigeria were married, more than two-fifths had no formal education nor access to credit and extension services respectively. In addition, almost all the respondents (97.1%)farmed less than one hectare of land (*Table 1.*).

Table 1. Distribution of maize farming household in rural Nigeria by socioeconomic characteristics.

Socioeconomic characteristics	Frequency	Percentage
Gender		
Male	696	85.3
Female	120	14.7
Age		
< 25	11	01.4
26-45	264	32.4
46-65	377	46.2
> 65	164	20.1
Marital Status		
Married	667	81.7
Never Married	149	18.3
Household size		
≤5	178	21.8
6-10	427	52.3
11-15	182	22.3
≥ 16	029	03.6
Credit		
Yes	148	18.1
No	668	81.9
Farm size		
< 1	792	97.1
1-2	018	2.20
> 2	006	0.70
Extension Service		
Yes	138	16.9

Socioeconomic characteristics	Frequency	Percentage
No	678	83.1
Educational Level		
No Formal Education	314	38.5
Primary Education	290	35.5
Secondary Education	143	17.5
Tertiary Education	069	08.5
Value of Asset		
≤ 25000	331	40.6
25001-50000	180	22.0
50001-75000	137	16.8
≥ 75000	168	20.6

Source: Authors' computation from GHS data

Table 2. Food insecurity profile of respondents by selected socioeconomic variables

Socioeconomiccharacteristics	Incidence (F_0)	Depth (F_1)	Severity (F_2)
Gender			
Male	0.39	0.14	0.07
Female	0.50	0.18	0.09
Age			
< 25	0.73	0.26	0.12
26-45	0.43	0.16	0.08
46-65	0.37	0.12	0.06
> 65	0.43	0.18	0.10
Marital Status			
Married	0.37	0.14	0.08
Never Married	0.52	0.19	0.24
Household size			
≤5	0.57	0.24	0.13
6-10	0.41	0.15	0.07
11-15	0.25	0.06	0.03
≥ 16	0.21	0.06	0.02
Credit			
Yes	0.35	0.12	0.05
No	0.41	0.15	0.08
Membership of Cooperative			
Yes	0.24	0.07	0.03
No	0.41	0.15	0.08
Extension Service			
Yes	0.33	0.14	0.07
No	0.42	0.15	0.08
Educational Level			
No Formal Education	0.48	0.19	0.10
Primary Education	0.36	0.12	0.05
Secondary Education	0.41	0.15	0.08
Tertiary Education	0.25	0.07	0.03
Value of Asset			

Socioeconomiccharacteristics	Incidence (F_0)	Depth (F_1)	Severity (F_2)
≤ 25000	0.50	0.20	0.11
25001-50000	0.37	0.13	0.06
50001-75000	0.36	0.11	0.05
≥ 75000	0.28	0.08	0.03
Zone			
North Central	0.51	0.22	0.12
North East	0.39	0.14	0.07
North West	0.40	0.15	0.08
South East	0.35	0.11	0.05
South South	0.23	0.05	0.01
South West	0.53	0.16	0.07

Source: Authors' computation from GHS data

The line for food insecurity was calculated to be ₦2883.20, or two-thirds of the average per-capita food expenditure for all households. Three food insecurity indices of incidence (F_0), depth (F_1), and severity (F_2), adopting the Foster, Greer, and Thorbecke poverty measure,were used to create a profile of the respondents' food insecurity. According to the distribution of households depending on their level of food insecurity,about two-fifths (40.1%) of the households experienced food insecurity, while approximately three-fifths (59.9%) did not. The condition of the households' food insecurity was further broken down based on a few socioeconomic factors, including gender, age, marital status, level of education, household size, and membership in a cooperative organisation. The final profile is shown in (*Table 2*), and the following points are discussed:

When data were broken down by gender, it became clear that households headed by women experienced food insecurity at a somewhat higher rate than those headed by men. Additionally, the level of food insecurity showed that female-headed households would need more money to escape food insecurity than male-headed households would, which would cost ₦518.90. The same pattern was observed in the food insecurity severity indices, which assess the degree of inequality in the distribution of food expenditures among the food insecure. Female-headed households had a marginally higher food insecurity severity index than male-headed households.

Regarding marital status, the findings revealed that married household heads had a lower rate of food insecurity than their counterparts who were single. According to the food insecurity depth indices of 0.37 and 0.52 for married and single heads, respectively, married household heads would need ₦1066.80 to escape food insecurity, whereas single heads would only need roughly ₦1499.30 to do so. A low level of inequality in the distribution of food expenditures between married and unmarried household heads was also indicated by the food insecurity severity indices of 0.08 and 0.24 for married and unmarried household heads, respectively.

The household heads without a formal education had the highest incidence of food insecurity (0.48) and depth (0.19), according to the educational status profile. This suggests that for household heads without a formal education, the average amount

needed to end food poverty is ₦183.90. Household heads with tertiary education, on the other hand, had the lowest incidence (0.25) and depth of food insecurity (0.07). Additionally, as compared to household heads with primary, secondary, or tertiary levels of education, inequality in the allocation of food expenditures was greatest among those without a formal education. Additionally, research on access to extension services revealed that household heads who lacked access had greater food insecurity than their counterparts who did. The gap and severity indices for food insecurity also displayed this pattern. The age breakdown also showed that household heads under 25 years had the highest frequency, depth, and severity of food insecurity, followed closely by household heads 65 years of age and above.

With regard to household size, there is less food insecurity as the size of the household rises. In particular, households with less than five members had the highest frequency (0.57), depth (0.24), and severity (0.13), whereas those with more than 16 members had the lowest incidence (0.21), depth (0.06), and severity (0.02). The number of labourers available to work on maize farms tends to grow with household size, especially if the distribution of household members allows for more adults to work, which lowers food insecurity in that household. This outcome is consistent with those reported by Omonona and Agoi (2007) and Babatunde et al. (2008).

The food insecurity transition matrix and their probabilities (*Table 3.*)show that while some households remain food insecure, some households indeed move in and out of food insecurity over a specific period. Specifically, about four-fifths of those who were food secure in 2012 remained so in 2015, while one-fifth of those who were food secure in 2012 transitioned to food insecurity in 2015. This study's significant conclusion is that no respondent went from being food insecure in 2012 to being food secure in 2015. As a result, all (100%) of the respondents who were food insecure in 2012 remained so in 2015. This finding makes it abundantly evident that people who are currently in a position of food security may not remain so tomorrow, especially if they are exposed to risks and uncertainties for which they lack the necessary resources as well as a lack of resilience when confronted with shocks.

Table 3. Food insecurity transition matrix of respondents included in this study

Food security status	Frequency	Percentage
Always food secure	489	59.9
Moving into food insecurity	125	15.3
Exiting food insecurity	0.0	0.0
Always food insecure	202	24.8
Total	816	100.0

Source: Authors' computation from GHS data

Labour Productivity Growth Among Maize Farming Households in Rural Nigeria.

The average labour productivity growth of maize farming households in rural Nigeria in 2012 and 2015 is shown in Table 4. The mean labour productivity in 2015 (6.1) was higher than the mean labour productivity in 2012 (2.3) implying that there was an increase in labour productivity of maize farming households between the periods. The labour productivity growth in rural Nigeria however stood at 0.2 indicating that the labour productivity of maize farming households in rural Nigeria is still very low.

Table 4. Labour productivity of maize farming households in rural Nigeria

Labour productivity	**Mean**	**Standard Dev.**
Labour productivity in 2015	6.1	15.1
Labour Productivity in 2012	2.3	4.7
Labour productivity growth	0.2	0.1

Source: Authors' computation from GHS data

As presented in Table 5, formaize farmers transiting from food securityinto food insecurity, household size, access to extension services and labour productivity growth were major factors influencing the transition into food insecurity. Specifically, household size had a negative effect and was significant at 1 per cent. This indicates that a member increase in household size would lead to a 0.116 unit decrease in the likelihood of maize farming households transiting from food security into food insecurity. An increase in household size increases the number of labour available to work on the farm and by extension labour productivity. This outcome is consistent with the findings of Okoedo-Okojie and Onemolease (2009), who found that a typical rural farmer's closest family members serve as his primary source of labour. A negative and significant 'access to extension' variable also implies that having access to extension services will lead to a 0.9879 unit decrease in the likelihood that households will transit from food security to food insecurity relative to those who remained food secure between the periods. This is probable since extension services enhance theability of the farmers to efficiently utilize resources and adopt new and improved methods of maize production, which in turn improve yield and help in meeting other necessities and by extension attaining food security status. This is in line with Obwona (2006), who reported that extension service is very essential to the improvement of farm productivity and efficiency among farmers. Labour productivity growth in line with *a prori* expectations had a positive effect on moving into food insecurity. Hence, a unit increase in labour productivity growth will lead to a 0.02987 decrease in the likelihood of maize farming households transiting from food securityinto food insecurity relative to households that are always food secure. In other words, the increase in labour productivity growth, although insignificant, was enough to pull some farmers out of their food-insecure state. An increase in labour productivity leads to an increase in output as well as income, profit, and investment opportunities. thereby reducing the transition into food insecurity.

The always food insecure category represents maize farming households in rural Nigeriathat were food insecure in 2012 and remained food insecure in 2015. Key determinants of this category include years of formal education, household size, membership in cooperatives and labour productivity growth. Years of formal education had a negative effect on being always food insecure or chronically food insecure. Thus, a year increase in the years of formal education will lead to a 0.0542 unit decrease in the likelihood of maize farming households remaining chronically food insecure relative to households who are always food secure. Hence, households with more years of formal education are more likely to exit food insecurity. . Human capital development improves farmers' awareness, perception, and adoption of innovations that can result in an improvement in productivity, which has a favourable impact on their ability to make decisions. This result is consistent with the claim of Ntshangase et al. (2018) that education makes it easier for people to adopt new technologies and better farming methods.Household size also had a negative effect. Specifically, a member increase in the household size will lead to a 0.219 decrease in the likelihood of maize farming households remaining food insecure relative to households that are always food secure. In other words, households with more members have a higher probability of exiting food insecurity, probably due to the possibility of higher availability of family labour.Being a member of a farmers'cooperative society also had negative effects. Specifically, being a memberwill lead to a 1.104 decrease in the likelihood that households would remain food insecure. This is because membership in a farmers' cooperative affords the farmers such benefits as improved access to production resources and agricultural information that will improve their production practices. This finding is in line with Ekong (2003) and Ajayi and Ogunlola (2005), who both reported that farmers who are members of cooperatives have advantages of accessibility to resources, micro-credit, input subsidy and social capital needed to improve productivity. Again, labour productivity growth had negative effects indicating that labour productivity growth reduced the likelihood of households remaining food insecure. This finding shows that labour productivity growth is a pertinent driver of food security in rural Nigeria.Thus, a boost for labour productivity growth should be targeted as a safety net, especially for the food insecure and households vulnerable to food insecurity.An interesting finding of this study is that no household exited food insecuritybetween the two periods, hence only 3 unordered categories of food insecurity transitions could be assessed.

Table 5. Effect of labour productivity growth on food insecurity transitions

Food insecurity transition categories	**dy/dx**	**SE**	**Z-value**	**P>|Z|**
Always food secure	(base outcome)			
Moving from food secure to food insecure				
Labour productivity growth	-.02987 **	0.012	-2.39	0.017
Years of formal education	-.02177	0.020	-1.08	0.282

Food insecurity transition categories	dy/dx	SE	Z-value	P>|Z|
Household size	-0.1160***	0.337	-3.45	0.001
Member of cooperative (yes)	-0.3181	0.534	-0.59	0.552
Access to extension (yes)	-0.9879***	0.369	-2.68	0.007
Distance to road (yes)	-.00088	0.006	-0.15	0.879
Access to credit (no)	-0.0801	0.267	-0.30	0.764
Always food insecure				
Labour productivity growth	-0.0242**	0.011	-2.10	0.035
Years of formal education	-0.0542***	0.018	-3.05	0.002
Household size	-0.2190***	0.030	-7.21	0.000
Member of cooperative (yes)	-1.1039 **	0.541	-2.04	0.042
Access to extension (yes)	0.1096	0.243	0.45	0.653
Distance toroad (yes)	0.0021	0.007	0.32	0.750
Access to credit (no)	0.3616	0.249	1.45	0.147

Source: Result of Regression Analysis

*** Significant at 1%, ** at 5%, * at 10%

Number of obs= 802

Wald chi2(14) = 89.28

Prob > chi2 = 0.0000

Pseudo R2 = 0.0692

Log pseudolikelihood=-696.6942

Conclusion

This study empirically established the link between labour productivity growth and food insecurity transitions among maize farming households in rural Nigeria.Labour productivity increased between the two periods although labour productivity growth was very low. Food insecurity was more chronic than transitory in rural Nigeria. In other words, the probability of remaining food insecure than exiting food insecurity, if already food insecure was higher. This has implications for government, policymakers and stakeholders in their targeted efforts, programs, and policies at reducing food insecurity in rural Nigeria. Labour productivity growth had significant effects on food insecurity transitions of maize farming households in rural Nigeria.

Labour productivity growth hadnegative effects on transitions into food insecurity and remaining food insecure. Labour productivity growth should therefore be one of the major focuses of interventions targeted at reducing food insecurity in rural Nigeria. Factors such as access to extension, distance to road, membership in cooperatives, and years of formal education also had significant effects on food security transitions among maize farming households in rural Nigeria.Based on the findings of the study,

policymakers should focus on policies aimed at enhancing labour productivity on the farm. This could be through improved access to extension services, social institutions,and by extension agricultural information targeted at cooperative farmers'groups.Further, human capital development in rural Nigeria should be prioritized by stakeholders since education allows the farmers to better understand the dynamics of agricultural labour productivity and resource management for improved food security.

Conflict of interests

The authors declare no conflict of interest.

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