



Original Research Article

Analysis of the Effects of Covid-19 Pandemic on Smallholder Oil Palm Farmers' Cropping Systems in Edo State

*¹Okere, R.A., ¹Akparanta, C.D., ²Onah, O.G., ¹Oloyede, A.O. and ³Mfonobong, E.

¹Agricultural Economics Division
Nigerian Institute for Oil Palm Research
Edo State, Nigeria

²Department of Agricultural Economics
University of Nigeria
Nsukka, Nigeria

³Department of Agricultural Economics
University of Calabar
Calabar, Nigeria

*Corresponding author: richy4chima@yahoo.com; +2348030854657

Received 28th August, 2021; Accepted 19th September, 2021; Corrected 30th September, 2021

Abstract

The study analyzed the effects of COVID-19 pandemic on smallholder oil palm farmers cropping systems in NIFOR in Ovia North East Local Government Area of Edo State, Nigeria. The study employed a random sampling method to collect a sample of 30 respondents used for data analysis. Data collected on socioeconomic features were analyzed with descriptive statistics, while a regression analysis was used to determine the COVID-19 pandemic effect on small holder oil palm farmers' cropping system. The result of the socioeconomic features showed that 83.3% of the farmers were aged 41 to 60, with a similar proportion of the respondents being females. The average cultivated farm size was 1-2 hectares, which generated a mean annual income of less than ₦100,000 per annum for 66.7% of the respondents. The regression result revealed that age, educational level, household size, income, cropping practices, distance to their farms and cost of planting materials were negatively significant in determining the impact of COVID-19 pandemic restrictions on smallholder oil palm farmers. The coefficient of multiple determination of 80.8% was an indication that the included explanatory variables of age, household size, income, cropping practices, distance and cost of planting materials significantly accounted for the effects of COVID-19 pandemic on small holder oil palm farmers' cropping system in the study area.

Key Words: COVID-19 Pandemic, Effect, Small Holder, Oil Palm, Cropping System

Introduction

COVID-19 known as coronavirus is no doubt a household named disease in which even the illiterates in the remote areas do make jest of by giving it names as "Corona titus", "Corona vampire"

Copyright © 2021 by The Faculty of Agriculture, Delta State University, Abraka, Nigeria This is an Open Access publication distributed under the terms of the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

“End-time disease” among other names as a result of the effect of the notorious weight of destruction globally. It is a well-known disease by every living human being on earth. Record has it that the first case of COVID-19 caused by coronavirus and SARS-COV2 was first reported by officials in Wuhan City, China in December 2019 (<https://www.who.int/coronavirus.org>). Coronavirus (COVID-19) is an infectious disease caused by a newly discovered coronavirus whose etiology is traced from Bats and Pangolins that spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes (Pak *et al.*, 2020). The symptoms experienced by those infected with the virus are mild to moderate respiratory illness which affects mostly older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

COVID-19 is a global pandemic ravaging the whole world which has severely affected the global economy and financial markets causing significant reductions in income, rise in unemployment rate, limitation in human resource, development and interactions, and disruptions in the transportation services, manufacturing industries and agricultural sector. The World Health Organization first announced the global COVID-19 outbreak in January 2020 (Ameh, 2020). World Health Organization (WHO) characterized COVID-19 as a pandemic, stating that over 3 million cases and 207,973 deaths had occurred in 213 countries and territories on the 11th of March, 2020 (Nigeria Centre for Disease Control (NCDC, 2020).

In the same light, the Federal government of Nigeria was proactive after the first confirmed case of COVID-19 in the country was detected in a traveler who arrived in Lagos from Europe on the 27th of February, 2020 (NCDC, 2020). In response to the Federal government’s measure to stop the spread, Nigeria's federal and state governments implemented lockdowns across most cities and states on the 26th of March, 2020 (NCDC, 2020) and the country was among the first on the subcontinent to enforce “lockdown” restricted measures such as; social distancing, regular hand washing with sanitizer, use of nose mask etc. The lockdown involved closing of all roads, borders and many non-essential businesses, which, in turn, brought about declining remittances and export demand which imposed significant economic costs on the country's population. The effect of the COVID-19 pandemic due to lockdown caused significant economic losses across the globe, which led to reduced productivity, loss of lives, business closures, and disruption of trade, commerce industries and tourism. The Covid-19 lockdown in Nigeria also had negative effects on the smallholder oil palm farmers, as most of the farmers were faced with a lot of difficulties. Though, most countries exempted agri-food systems from “lockdown” policies introduced to curb food security, limitations in other sectors of the economy took their toll on agri-businesses. Increase in costs of goods and services which accompanied the lockdown, coupled with disruptions in the supply chains and falling consumer demands also impacted negatively on the agricultural sector.

Nigeria is the fifth largest producer of palm oil globally, with about 80% of palm oil producers consisting of dispersed smallholder farmers (Solidaridad, 2020) whose productivity was equally affected by the pandemic. The livelihood of vulnerable rural households in fragile environments such as Nigeria and some other countries have been affected by the unprecedented circumstances of the COVID-19 pandemic. The COVID-19 pandemic affected smallholder oil palm farmers who are the major producers of food in their cropping system practices as many have lost income-generating opportunities.

Cropping systems refer to the sequence and management techniques used on a particular agricultural field over a period of years NIFOR (2012). Smallholder farmers control oil palm cultivation in Nigeria. Their farms cover a range of 1-5 hectares each, on the average, and are sometimes characterized by mixed cropping to maximize land usage. Mixed farming is a practice of cultivating more than two crops on the same land in order to maximize crop yield with different types. Empirical evidence shows that planting oil palm with food crops at the spacing of 9m x 16m and 9m x 20m makes fresh fruit bunch yields better per hectare (Nwawe *et al.*, 2008).

However, in order to ameliorate the problems of food production by smallholder oil palm farmers in Nigeria, scholars and institutions, especially the Nigerian Institute for Oil Palm Research, Benin, has made several attempts in finding solutions, and have developed an innovative modern technique of cropping system known as “the farming/cropping system” in which arable crops are planted on the same field with already existing, growing oil palm trees to increase output. This programme has been active, productive and efficient, and has made it possible for smallholder oil palm farmers to achieve massive output and drastically enhance their living standards. The initiative was, however, hindered as a result of the COVID-19 outbreak which affected the programme through increases in the cost of inputs, and low prices and demand of outputs which led to food scarcity and shortage as was seen since the year 2020.

In Nigeria, smallholder farmers are the major contributors to the agricultural sector which aggregates to the GDP of the economy. The agricultural sector grew from 2.12% in 2018 to 2.36% in 2019 and declined to 2.17% in 2020 as a result of the COVID-19 outbreak Abdulkareem and Izuaka (2021). The authors further stated that the major shortfall was as a result of the COVID-19 outbreak and other instabilities among the key food producers. The onset of the lockdown in March 2020 which was the beginning of the planting season hindered the purchasing of planting materials leading to low output, food scarcity and supply as opposed by the findings of Okere (2015) that planting materials showed positive effect at 5% levels of significant. As a result of the pandemic, the annual growth of the agricultural sector in Nigeria is expected to be 2.5% lower than five years back with average growth rate of 3.0%, and Agricultural sector GDP decreased from 5268290.12 million Naira to 3760880.60 million Naira in the fourth quarter of 2020, (Trading Economics, 2021). This posed a lot of adverse effects, as hunger and starvation loomed everywhere thereby affecting food security, sustainability and the standard of living of the people. This was in line with Andam *et al.* (2020) and Pak *et al.* (2020), who opined that COVID-19 pandemic had economic effects on the national gross domestic product (GDP), agri-food system GDP, and the number of people living below the international US\$1.90 per day poverty line. He further stated that the agri-food system, which is the primary means of livelihood for most Nigerians, suffered an 11.1% loss in output (US\$1.6 billion). In a nutshell, this study tends to analyze the COVID-19 pandemic effect on smallholder oil palm farmers cropping system with the aim of examining the socioeconomic features and to determine the effect of smallholder oil palm farmers cropping system.

Methodology

Study area

The research was carried out within NIFOR community that is located in Ovia North East local government area (LGA) of Edo State, Nigeria. Ovia North East is one of the LGAs in Edo South

Agro-ecological zone consisting of seven (7) blocks namely, Oredo, Ovia South West, Ovia North East, Ikpoba-Okha, Egor, Ujunmwode and Orhionwon LGAs. Edo State is divided into three Agro-ecological zones; Edo North, Edo Central and Edo South (EADP, 2018). The State was created in 1991 out of the former Bendel State with an estimated population of 3,218,332 comprising 1,640,461 males and 1,577,871 females at a growth rate of 2.7% per annum (NPC, 2006). The State lies between longitude 06° 04'E and 06° 43'E and latitude 05° 44'N and 07° 34'N. It is bounded in the south by Delta State, in the west by Ondo State, to the North by Kogi State and to the east by a part of Delta State too. It occupies a land area of about 19,187 sq km. Its soil is suitable for oil palm production, and for cultivation of several other tropical crops.

Sampling procedure

Ovia North East was purposively chosen because of the high concentration of smallholder oil palm farmers, and the presence of a NIFOR community which hosts the palm research station that oversees the activities of these farmers as to ascertain their production capacity under a programme tagged “Farming/Cropping System” targeted at alleviating rural poverty and enhancing the living standards of rural dwellers through increased productivity. A random sampling method was used to select 30 respondents from the area.

Data collection and analysis

The study employed the use of primary data obtained from the field survey through a well-structured questionnaire, and through focus and group discussions, and personal interviews. The data on the socioeconomic characteristics like age, sex, marital status, educational level, household size, experience, farm size, annual income, distance etc obtained were analyzed using descriptive statistics such as frequency and percentages, while those on the effects of COVID-19 pandemic on smallholder oil palm farmers’ cropping systems were subjected to multiple regression analysis as follows:

$$A = f(X_1 + X_2 + \dots + X_n + e) \dots\dots\dots (1)$$

Where A = COVID-19 Effect on Cropping System

- X₁ = Age (years)
- X₂ = Sex (Male = 1 or female = 0)
- X₃ = Marital Status (dummy = 1 or 0)
- X₄ = Educational Level (No.)
- X₅ = Farming Experience (years)
- X₆ = Farm Size (Ha.)
- X₇ = Household Size (No.)
- X₈ = Annual Income (Nigerian Naira, ₦)
- X₉ = Management /Cropping Practices (No.)

X₁₀ = Crops Sold (No.)

X₁₁ = Cost of planting materials (₦)

e = Error Term

Explicitly expressed, the Linear Function becomes:

$$A = Y_0 + Y_1X_1 + Y_2X_2 + Y_3X_3 + Y_4X_4 + Y_5X_5 + Y_6X_6 + Y_7X_7 + Y_8X_8 + Y_9X_9 + Y_{10}X_{10} + Y_{11}X_{11} + e \dots\dots\dots (2)$$

Where:

A, X₁, X₂, X₃, X₄, X₅, X₆, X₇, X₈, X₉, X₁₀, X₁₁ are as stated above,

Y₀ = constant/intercept,

Y₁ – Y₁₁ = regression coefficients and

e = error term.

The effect of smallholder oil palm farmers cropping system was subjected to a regression model, and the variables were fitted into three functional forms of linear, semilog and double forms. The Linear model emerged the best fit with the highest co-efficient of multiple determination and F-statistics, highest number of significant explanatory variables and the highest number of consistent *a priori* expectations, based on the signs of the explanatory variables

Results and Discussion

The age distribution of the smallholder oil palm farmers (Table 1) shows that majority of the farmers (83.3%) fell within a bracket of 40 to 60 years, which is the active age affected by COVID-19 pandemic as Okere (2012) opined, that people in this age bracket are the major actors in the cropping system. These people were mostly affected because of the fears of being arrested by security personnel for violating lockdown regulations (Muvhuringi *et al.*, 2021), and from contacting Covid-19, especially by those above sixty years, thereby hindering them from their productive activities. The result shows that 83.3% of respondents were females who were the major participants in smallholder oil palm cropping system that the COVID-19 lockdown restricted from carrying out their cropping system practices. This is similar to the findings of Ugwoke *et al.* (2004) who observed that about 90% of rural farmers in agricultural activities were dominated by female farmers.

The result from the table shows that 66.7% of the respondents were married, implying that the COVID-19 lockdown is likely to have made it difficult for them to cater for their families, which is in tandem with the findings of Okere *et al.* (2015) who observed same. In terms of level of education, as much as 83.3% of the farmers had primary education or non-formal education, which is likely to have posed a serious limitation or threat to their observation of the COVID-19 lockdown protocols, thereby affecting their farming effectiveness as knowledge is power that equips farmers with enough managerial skills for agri-business. The result also showed that 66.6% of the farmers in the area had household sizes of above 10 persons who supplied family labour and feeds from the proceeds from the farms. The incident of COVID-19 lockdown must have had drastic effects

Table 1: Socioeconomic characteristics of the farmers

Variables	Frequency	Percentages
Age (years)		
20-40	5	16.7
41-60	25	83.3
≥ 60	5	16.7
Total	30	100.0
Sex		
Male	5	16.7
Female	25	83.3
Total	30	100.0
Marital status		
Single	5	16.7
Married	20	66.7
Widowed	4	13.3
Divorced	1	3.3
Total	30	100.0
Educational level		
Non-formal	15	50.0
Primary	10	33.3
Secondary	3	10.0
Tertiary	2	6.6
Total	30	100.0
Household size		
1-5	15	50.0
6-10	10	33.3
≥ 10	5	16.7
Total	30	100.0
Experience (years)		
1-10	5	16.7
11-20	10	33.3
21-30	10	33.3
≥ 30	5	16.7
Total	30	100.0
Annual income (₦)		
50000-100000	20	66.7
150000-200000	5	16.7
≥ 2500000	5	16.7
Total	30	100.0
Cropping Practices (No.)		
1-2	10	33.3
3-5	15	50.0
≥ 5	5	16.7
Total	30	100.0
Farm Size (ha)		
1-2	20	66.7
3-4	5	16.7
≥ 5	5	16.7
Total	30	100.0
Distance (kg)		
1-5	25	83.3
6-10	5	16.7
Total	30	100.0

Source: Field Survey 2020

on these as they were unable to move around to cater for their large household needs, in which poverty, hunger and starvation was the outcome (Muvhuringi *et al.*, 2021). Most families lost their loved ones from complications of the virus, and due to problems imposed by COVID-19 lockdown.

The many years of farming experience (11 – 30 years) among most (66.6%) of the smallholder oil palm farmers notwithstanding, the COVID-19 lockdown must have dealt with them adversely, as experience did not play any role in mitigating the adverse economic effects of the pandemic. The total annual income was seriously affected as 66.7% of them were only able to get from ₦50000 - ₦100000 per annum compared to the amount of over ₦100000 obtained, on the average as profit, by the same farmers annually before the outbreak of the COVID-19 pandemic (Okere, 2015; Funmilayo *et al.*, 2021). The proportion of respondents who engaged in multiple cropping practices (mixed cropping, crop rotation, manuring, leaching etc) also declined following the COVID-19 lockdown with only 50% of them practicing 2-3 types, unlike what obtained before the pandemic. The farm size cultivated by 66.6% of the respondents during the lockdown was only 1-2 hectares of land on the average, mainly because most farmers were scared of the uncertainties of the time, and held their money from meaningful productive investments. The long distance, 1-5 kilometers, which most of the farmers had to travel to their farms was an impediment, as COVID-19 lockdown posed restricted movement which affected movement to the farm for production and movement to markets for purchase of farm inputs and sale of outputs (Muvhuringi *et al.*, 2021).

Table 2: Regression result of the effects of COVID-19 on smallholder oil palm cropping system in Edo State

Variables	Linear
Constant	0.710(0.011)
X1= Age (years)	-5.832(2.159)***
X2= Sex (Male=1; Female=0)	2.861(1.048)***
X3= Educational level (No)	-0.017(0.017)
X4= Marital status (Married = 1; Single = 0)	5.758(0.060)
X5= Household size (No)	-0.001(3.105)*
X6= Experience (years)	0.005(0.004)
X7= Annual income (₦)	-5.076(2.141) **
X8= Cropping Practices (No)	-2.753(1.429) ***
X9= Farm Size (ha)	2.701(0.500)
X10= Distance (kg)	-3.987(1.301)***
X11= Cost of planting materials (₦)	-0.343(1.130) ***
R ²	0.808
Adj R ²	0.737
F-value	23.646

Source: Field Survey 2020; *, **, and *** = significant at 5%, 1% and 0.1% respectively

Equation form of the COVID-19 pandemic effect of smallholder oil palm cropping system

$$A = 0.710 - 5.832X_1^{xxx} + 2.861X_2^{xxx} - 0.017X_3 + 5.758X_4 - 0.001X_5^x + 0.005X_6^{xx} - 5.076X_7^{xx} - 2.753X_8^{xxx} + 2.701X_9 - 3.987X_{10}^{xxx} - 0.343X_{11}^{xxx}$$

The above equation was the outcome of the best fit model from the regression analysis of the three functional forms; linear, semi-log and Double-log of which the linear model was considered the most appropriate, and had the highest coefficient of multiple determination, R^2 of 0.808. This shows that 80.8% variations of the COVID-19 pandemic effect on smallholder oil palm farmers' cropping system was accounted for by the included explanatory variables, with the Adj R^2 being 0.737, and an F-Stat of 23.646. Age, sex, number of cropping practices, distance and cost of planting materials showed negative and highly significant effects at 1% level of significance, on the effects of the COVID-19 pandemic on smallholder oil palm farmers cropping system, indicating that these variables impacted negatively on the farmers' activities as a result of the pandemic. Closure of the nation's borders with neighbouring countries during the pandemic also led to restrictions in imports and high prices of some common commodities, according to Business Day (2020). Household size was negative and significant at 10%, indicating that any increase in rise or outbreak of COVID-19 had a 3.987% effect on the household size; a clear indication of the COVID-19 pandemic effect of smallholder oil palm farmers cropping system in the area. Annual income was negatively significant at 5% level which shows that an extension of the COVID-19 pandemic leads to a 5.076% reduction in income of the smallholder oil palm farmers cropping system as many lost income-generating opportunities thereby increasing the level of poverty and lowering the standard of living of this group of people and the society at large as observed by Solidaridad (2020). This also implies that the outbreak of COVID-19 pandemic affected the smallholder oil palm farmers cropping system output that aggregated to the GDP of the country as opined by Pak *et al.* (2020).

Conclusion

The research dealt on the analysis of COVID-19 effect on smallholder oil palm farmers in Edo State. A sample size of 30 respondents was randomly collected and analyzed using descriptive and econometric tools. The result showed that age, educational level, household size, income, cropping practices, distance and cost of planting material were negatively significant in determining the effects of COVID-19 on smallholder oil palm farmers' cropping system. The study recommends that the farmers should, in the future, adopt coping strategies such as use of track routes to their farms and market places to avoid harassment by security personnel, and increase their production capacity while observing COVID-19 rules and regulations.

References

- Abdulkareem, M. and Izuaka, M. (2021). Nigeria's agricultural sector grows 2.17% in 2020. Premium Times, Nigeria; extracted from National Bureau of Statistics (2021).
- Ameh, J. (2020). Covid-19: Buhari names 12-member presidential task force to control spread. <https://punchng.com/covid-19-buhari-names-12-member-presidential-task-force-to-control-spread/> Punch, March 9, 2020. [Google Scholar]
- Andam, K., Edeh, H., Oboh, V., Pauw, K. and Thurlow, J. (2020). Impacts of COVID-19 on food systems and poverty in Nigeria. *Advances in Food Security and Sustainability* 5: 145–173.
- Business Day (2020). Nigeria's Agriculture at a Glance. [Businessday.ng](https://www.businessday.ng)

- Funmilayo, F.I., Olayinka, S.I. and Aanuoluwapo, A.A. (2021). The effects of the COVID-19 pandemic on food losses in the agricultural value chains in Africa: The Nigerian case study. *Public Health in Practice 2*: 1-3.
- Muvhuringi, P.B., Nyamuziwa, T.K. and Chigede, N. (2021). The impact of COVID-19 on agricultural extension and food supply in Zimbabwe. *Cogent Food and Agriculture 7*(1): 1918428, pp. 1-10.
- NCDC (2020). First case of corona virus disease confirmed in Nigeria. Nigeria Centre for Disease Control, Abuja, Nigeria. Downloaded on March 30th 2020 from <https://ncdc.gov.ng/news/227/first-case-of-corona-virus-disease-confirmed-in-nigeria>).
- NIFOR (2012). *Annual Report, 2012*. Nigerian Institute for Oil Palm Research. Pp 102-105.
- NPC (2006). *Statistics Bulletin*. Ministry of Agriculture, Edo State. National Population Commission, Abuja, Nigeria
- Nwawe, C.N., Akintola, J.O., Ikpi, A.E. and. Rahji, M.A.Y. (2008). Optimum plans for Oilpalm and food crop combinations in Edo and Delta states of Nigeria: Application of Recursive Linear Programming. *Journal of Agriculture, Forestry and the Social Sciences 6*(1): 1-16.
- Okere. R.A., Orebiyi, J.S. and Ohajianya, D.O. (2012). *Analysis of Land Value Systems and Productivity of Cassava in Imo State*. M.Sc. Thesis, Federal University of Technology, Owerri (Unpublished).
- Okere, R.A., Uwubanmwem, I.O., Garba, I.D., Oisakede, I.I., Akparanta, D.C. and Maduiké, A.I. (2015). Economic analysis of intercropping oil palm with food crops by small holder farmers in Edo State. *Journal of Agricultural Research and Policy 10*(1): 1-7.
- Pak, A., Adegboye, O.A., Adekunle, A.I., Rahman, K.M., McBryde, E.S. and Eisen, D.P. (2020). Economic consequences of the COVID-19 outbreak: the need for epidemic preparedness. *Frontiers in Public Health 8*(Article 241): 1-4.
doi: 10.3389/fpubh.2020.00241
- Solidaridad (2020). Smallholder Oil Palm Farmers Improve Their Livelihood In Nigeria. <https://www.solidaridadnetwork.org/story/smallholder-oil-palm-farmers-improve-their-livelihood-in-nigeria/>
- Trading Economics (2021). “Subsectors”, Nigeria GDP From Agriculture. tradingeconomics.com/nigeriagov.
- Ugwoke, F.O., Odurukwe, S.N. and Oguamah, I.C. (2004). Gender roles and impacts of oil palm commercialization on intra-household dynamics in Imo State, Nigeria. *International Journal for Agriculture and Rural Development 1*(9): 12-18.