Journal of Agricultural Extension

Vol. 27 (4) October 2023

ISSN(e): 24086851; ISSN(Print): 1119944X

Website: https://www.journal.aesonnigeria.org; https://www.ajol.info/index.php/jae

Email: editorinchief@aesonnigeria.org; agricultural.extension.nigeria@gmail.com

Cost of Farm Operations for Major Cereals in Nigeria

https://dx.doi.org/10.4314/jae.v27i4.6

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Submitted: 5th July 2023

First Request for Revision: 24th July 2023

Revisions: 24th ,31st July 2023.

Accepted: 22 September 2023

Published: 15th October 2023

Cite as: Issa, F. O. (2023). Cost of farm operations for major cereals in Nigeria. *Journal of Agricultural Extension, 27*(4),53-66 https://dx.doi.org/10.3835/jae.v27i4.6

Keywords: Production cost of cereals, farm operations, cost of food prices

Conflict of interest: The authors declare no potential conflict of interest.

Acknowledgement: Authors would like to acknowledge the National Agricultural Extension and Research Liaison Services, for funding the Agricultural Performance Survey from which data for this study was obtained.

Authors' contributions:

IFO: (100%) Conceptualization; Data curation; Formal analysis; Methodology; Writing - original draft; Writing - review & editing

Abstract

This study assessed the cost of farm operations for major cereals in Nigeria. Secondary data obtained from the Annual Agricultural Performance Survey Report of the National Agricultural Extension and Research Liaison Services (NAERLS) was used to compute the cost of 12 farm operations as well as the percentage change in the cost from 2021 to 2022. Results showed that the cost of farm operations for producing major cereals recorded a very high increase across the states in Nigeria. The percentage increase in the cost of farm operations for producing a hectare was higher for maize (25.4%) than rice (18.3%). Furthermore, the percentage increase in the cost of farm operations for producing a hectare of maize was higher in the Northern region (34.9%) than in the South (17.2%). For rice, the percentage increase was higher in the Southern region (21.8%) than in the North (13.7%). The cost of farm operations has generally increased thereby threatening food prices. Efficient tractor-hiring services should be made available at subsidized rates at all LGAs through public-private partnership arrangements in Nigeria.

Introduction

Farm operations in cereal production include land clearing, ploughing, harrowing, ridging, planting, transplanting, weeding, fertilizer application, spraying, irrigation, harvesting and transportation. These operations are usually carried out by using human labour or machine. The cost of each operation varies across different locations, thereby making it critical to investment decisions in agricultural production. The cost associated with these farm operations also determines the price of the produce (FAO, 2012; Sanchi, Al-Hassan and Sabo, 2022). In most cases, the cost of human labour is cheaper than using

machines. However, use of machine is usually less tedious, faster and more precise. Hence, there are advantages and disadvantages to the choice of human labour and machines. Using farm labour for any of the operations depends the on availability of labourers as most of the operations can take days to be completed if there are not enough hands to execute the work. Many farmers lack the resources to acquire agricultural machinery like tractors and ploughs (Shani and Musa 2021). The mixed cropping system practised by most Nigerian farmers discourages the use of machines. Takeshima (2016) noted the market imperfections in tractor service provision in Nigeria as a major problem discouraging the use of tractors by farmers to carry out their farm operations in a seamless manner.

The induced technical change theory argues that changes in relative factor prices play a central role in the direction of technological change, such that farmers will adopt technology that can save scarce and expensive agricultural input (Issa et al., 2015; Tian et al., 2019). From the perspective of farmers, replacing labour with other abundant and relatively cheaper inputs, such as machinery (input substitution), would be a good way to overcome the rising cost of labour in agricultural production. Rising farm wages and farm labour costs are considered one of the driving forces of agricultural production (Takeshima, Nin-Pratt, and Diao 2013). Increasing wages raises the cost of labour, and induces farmers with high land endowments to substitute labour with machines while inducing farmers with low land endowments to exit agriculture.

Nigeria's agricultural landscape is dominated by small-scale holdings, where human labour plays a vital role in most farm activities. Farmers display a tactical approach, carefully choosing between utilizing machines and human labour for different tasks. Typically, they opt to use machines for labour-intensive land preparations, reserving human labour for planting activities. This strategic allocation of resources aims to optimize efficiency and productivity in the agricultural process. The type of household also determines the decision to hire farm workers. For example, farm households are less likely to hire agricultural workers (76% at the national level) than nonfarm households, patterns found (by Takeshima (2016) as similar across regions in Nigeria. The cost of man-day also varies across regions in Nigeria.

Major cereals produced in Nigeria include rice, sorghum, maize and pear millet. They are mostly grown in the savannah agro-ecological zone of the country (Agriculture, 2019), which accounts for about 665,600 square kilometres (about 67 million hectares), which also represents about 70% of the geographical area of Nigeria (Ismaila et al., 2020). It is located between latitude 07° to 14°N and longitude 03° and 15°E. However, cereals such as maize and rice are produced across all the agroecological zones (in fact all States) in Nigeria. Cereal production (metric tons) in Nigeria was reported at 29,910,609 metric tons in 2021, according to the World Bank collection of development indicators (Trading Economics (2023). Nigeria is the highest producer of rice in Africa followed by Egypt and Madagascar, and 13th in the world. The country moved from producing 2.0MMT of rice in 2007 to almost 3.8MMT in 2018 (Nigerian Tribune, 2023).

Several factors can be adduced as responsible for changes in the cost of farm operations for cereal production in the country. These include, insecurity (Premium Times (2021) which has worsened the unavailability of labour, gradual rise in education level in the rural areas (Takeshima, 2016) which affects agricultural labour supply, high cost and unavailability of farm machines, and high diesel prices which has pushed up the cost of ploughing farms (Gyimah-Brempong et al., 2016; NATION, 2020).

Hence, this study examines the cost of farm operations and the percentage changes in the cost of farm operations from 2021 to 2022 in Nigeria. Specifically, this study examined the cost of farm operations of major cereals in Nigeria (2021-2022), and ascertained the percentage change in the cost of farm operations from 2021 to 2022.

Methodology

This study covered all the states in Nigeria including the Federal Capital Territory, Abuja. All small-holder farmers in Nigeria constituted the population for the study. Multi-stage sampling procedure was used to select farmers. First, all states and FCT were totally selected. Second, two ADP zones were randomly selected per state. Third, two LGAs per ADP zone were purposively selected (i.e., 4 LGAs per State). The basis for purposive selection was to avoid insecurity issues. Fourth, one community per LGA was purposively selected based on the availability of farmers. Lastly, five farmers per community were randomly selected. In all, 146 communities and 740 farmers were used across the nation. Focus group discussions were held at every community in order to validate the data collected from individual respondents.

Farmers were visited in each State. Data were collected using an interview schedule digitized on mobile devices via an installed Open Data Kit (ODK) application. Farm operations in cereals production considered in this study include land clearing, ploughing, harrowing, ridging, planting, transplanting, weeding, fertilizer application, spraying, irrigation, harvesting and transportation. The study captures the cost of each farm operation. In computing the total cost of production, farmers were requested to specify the size of the farm, as well as the amount spent on each farm operation (either using a machine or manual labour). For manual labour, cost for each operation were computed by considering the number of labours used, the number of days spent to complete each of the operations, cost per man-day in the community, and the number of hours considered as man-day. The addition of the costs for all farm operations is taken as the cost of farm operations (CFOs) for a particular community. The CFOs for the state is derived from the mean cost obtained from all the sampled farmers in the states. Percentage change in cost of farm operations (from 2021 to 2022) was calculated thus: (2022 cost – 2021 cost)/2021 cost*100

Results and discussion

Cost of Farm Operations and Percentage Change for Major Cereals in Nigeria (2021 to 2022)

The cost of farm operations in each state is discussed based on agroecological zones in Nigeria. It was also compared based on the two regions (North and South), and finally, the national outlook was presented.

Cost of farm operations in the North-central zone

In 2022, the cost of farm operations to produce one hectare of maize in the NCZ recorded the highest in Kogi State (₦380,800), but lowest in FCT (₦200,000). Percentage increase in the cost of farm operations (CFOs) to produce maize was highest in Kwara State (61%), but was lowest in Benue State (3%). Similarly, the cost of farm operations to produce one hectare of millet in the NCZ was recorded as the highest in Kwara State (₦290,000), but lowest in Plateau State (₦110,000). The percentage increase in CFOs to produce millet was highest in Nasarawa State (about 79%). The percentage increase was lowest in Kwara State (4.3%). In the same vein, the CFOs to produce one hectare of rice in the NCZ recorded the highest in Kogi State (₦480,000), compared to Plateau State (₦200,000). For the percentage increase in CFOs to produce rice, FCT recorded the highest (67%), while Nasarawa State recorded the lowest (7.8%). However, CFOs for rice were reduced by 30% in Taraba State. For sorghum, the cost of farm operations for producing one hectare in the NCZ recorded the highest in Kwara State (₦362,000), compared to FCT (₦150,000). The percentage increase in CFOs for producing sorghum was highest in FCT (66.7%), but was lowest in Kwara State (4.9%) (Table 1).

The average CFOs for producing rice in the NCZ is higher (₦310,050) than any other cereals. However, the percentage increase in CFOs for producing a hectare of cereal was highest in maize (30.2%) but lowest in rice (6.3%). Generally, the cost of farm operations for producing major cereals shows a very high increase (ranging from 3-78%) across the states in the NCZ.

Table 1: Cost of farm operations in the North-central zone

States	Maize			Millet			Rice			Sorghum		
	CFOs (₦)		% Change	CFOs (₦)		% Chang	CFOs (₦)		% Change	CFOs (₦)		% Change
	2021	2022		2021	2022		2021	2022		2021	2022	
Benue	358,000	370,000	3.4	-	-	-	375,000	450,000	20	260,000	290,000	11.5
FCT	154,000	200,000	29.9	84,000	130,000	54.8	150,000	250,000	66.7	90,000	150,000	66.7
Kogi	250,000	380,800	52.3	-	-		450,000	480,000	6.7	-	-	
Kwara	180,000	290,000	61.1	278,000	290,000	4.3	216,000	320,000	48.1	345,000	362,000	4.9
Nasarawa	160,000	250,100	56.3	84,000	150,100	78.7	260,000	280,400	7.8	130,000	195,500	50.4
Niger	200,000	230,000	15.0	-	-		230,000	250,000	8.7	-	-	
Plateau	-	320,000		-	110,000		-	200,000		-	-	
Taraba	251,000	270,000	7.6	-	-		360,000	250,000	-30.6	220,000	250,000	13.6
Zonal Mean	**221,857**	**288,863**	**30.2**	**148,667**	**170,025**	**14.4**	**291,571**	**310,050**	**6.3**	**209,000**	**249,500**	**19.4**

Source: Adapted from NAERLS and FMARD, 2022
CFOs=Cost of farm operations

Table 2: Cost of farm operations in the North-east zone

States	Maize			Millet			Rice			Sorghum		
	CFOs (₦)		% Change	CFOs (₦)		% Change	CFOs (₦)		% Change	CFOs (₦)		% Change
	2021	2022		2021	2021		2021	2021		2021	2022	
Adamawa	198,000	235,000	18.7	146,000	172,000	-	238,000	260,000	9.2	146,000	172,000	17.8
Bauchi	250,000	280,000	12.0	150,000	220,000	46.7	300,000	357,000	19.0	150,000	220,000	46.7
Borno	92,000	279,500	203.8	80,000	155,000	93.8	-	-		80,000	155,000	93.8
Gombe	270,000	300,000	11.1	138,653	150,000	8.2	246,820	260,000	5.3	138,653	150,000	8.2
Yobe	-	-		-	-		-	-		-	-	
Zonal Mean	**202,500**	**273,625**	**35.1**	**128,663**	**174,250**	**35.4**	**261,607**	**292,333**	**11.7**	**128,663**	**174,250**	**35.4**

CFOs=Cost of farm operations

Cost of Farm Operations in the North-East Zone

Table 2 shows that, in 2022, the cost of farm operations (CFOs) for producing one hectare of maize in the NEZ recorded the highest in Gombe State (₦300,000), but lowest in Adamawa (₦235,000). The percentage increase in the CFOs for producing maize was highest in Borno State (about 204%), but was lowest in Gombe State (11.1%). Similarly, the CFOs to produce one hectare of millet in the NEZ recorded the highest in Bauchi State (₦281,600), but lowest in Borno State (₦125,800). The percentage increase in CFOs for producing millet was highest in Borno State (93.8%), while it was lowest in Gombe State (8.2%). In the same vein, the CFOs for producing one hectare of rice in the NEZ recorded the highest in Bauchi State (₦220,000), compared to Gombe State (₦150,000).

In rice production, the highest percentage increase in CFOs was observed in Bauchi State (19%), while the lowest increase was seen in Gombe State (about 5%). For sorghum, the CFOs to produce one hectare in the NEZ were highest in Kwara State (₦362,000), in contrast to FCT (₦150,000). Furthermore, concerning sorghum production, the highest percentage increase in CFOs was reported in Borno (93.8%), whereas the lowest increase was recorded in Gombe State (8.2%).

The average cost of producing rice in the NEZ is higher (₦292,333) than any other cereals. However, the percentage change in CFOs for producing a hectare of cereal was highest in millet and sorghum (35.4%) but lowest in rice (11.7%). Generally, the CFOs for producing major cereals show a very high increase (5-203%) across the states in the NEZ.

Cost of Farm Operations in the North-West Zone

In 2022, the cost of farm operations (CFOs) needed to produce one hectare of maize in Kaduna State was ₦320,000. The percentage increase in the CFOs for producing maize rose by about 12%. Similarly, the CFOs for producing one hectare of millet in the NWZ recorded the highest in Jigawa and Kano States (₦240,000), but lowest in Borno State (₦125,800). Percentage increase in CFOs for producing millet was highest in Kano State (207.7%), while it was lowest in Zamfara State (25%). In the same vein, the CFOs for producing one hectare of rice in the NWZ recorded the highest in Kano State (₦286,000), compared to Zamfara State (₦180,000). Percentage increase in CFOs for producing rice was highest in Kaduna State (72%), but lowest in Zamfara State (18%). No increase in the CFOs for producing rice in Jigawa State. For sorghum, the CFOs for producing one hectare in the NWZ recorded the highest in Kaduna State (₦220,000), compared to Kano State (₦140,000). Also, percentage increase in CFOs for producing a hectare of sorghum was highest in Kaduna State (158.8%), and recorded lowest in Zamfara State (13.6%).

The average CFOs for producing maize in the NWZ is higher (₦320,000) than any other cereals. However, the percentage increase in CFOs for producing a hectare of cereal was highest in millet (62.2%) but lowest in maize (27.3%) (Table 3). Overall, the CFOs for producing major cereals show a very high increase (ranging from 12-158%) across the states in the NWZ.

Comparative Cost of Farm Operations and Percentage Change in the Northern Zones

As indicated in Table 4, the average cost of farm operations (CFOs) for producing one hectare of maize across the northern zones reveals that it is costlier to produce maize in the NWZ (₦320,000) compared to the NC (₦288,863) and NE (₦273,625). Similarly, it is costlier to produce millet in the NWZ (₦210,000) compared to the NE (₦192,863) and NC (₦170,025). The average CFOs for producing one hectare of rice across the northern zones reveals that it is costlier to produce rice in the NCZ (₦310,050) compared to the NE (₦292,333) and NW (₦249,000). Furthermore, it is costlier to produce sorghum in the NCZ (₦249,500) compared to the NW (₦192,500) and NE (₦174,250). The CFOs for producing a hectare of millet rose by 62.2% from 2021 to 2022, while the CFOs for producing sorghum in the NWZ rose by over 40%. For maize, the highest percentage change was recorded in the NWZ (39.1%) between 2021 and 2022 (Table 4). Generally, the high percentage increase in the CFOs for the production of cereals was highest in the NWZ compared with other zones in the north.

The average CFOs for producing maize in the north is higher (₦294,162) than any other cereals. However, the percentage increase in CFOs for producing a hectare of cereal was highest in rice (43.5%) but lowest in maize (13.7%) (Table 4). Overall, the CFOs for producing major cereals show a very high increase (ranging from 6-62%) across the states in the Northern region.

Table 3: Cost of farm operations in the North-West zone

States	Maize			Millet			Rice			Sorghum		
	CFOs (₦)		% Change	CFOs (₦)		% Change	CFOs (₦)		% Change	CFOs (₦)		% Change
	2021	2022		2021	2022		2021	2022		2021	2022	
Jigawa	-	-	-	160,000	240,000	50	280,000	280,000	0	170,000	210,000	23.5
Kaduna	285,000	320,000	12.3	-	-		145,000	250,000	72.4	85,000	220,000	158.8
Kano	-	-		78,000	240,000	207.7	190,000	286,000	50.5	80,000	140,000	75.0
Kebbi	175,000	-		160,000	-		210,000	-		175,000	-	
Zamfara	-	-		120,000	150,000	25.0	153,000	180,000	17.6	176,000	200,000	13.6
Zonal Mean	**230,000**	**320,000**	**39.1**	**129,500**	**210,000**	**62.2**	**195,600**	**249,000**	**27.3**	**137,200**	**192,500**	**40.3**

CFOs=Total cost of farm operations

Table 4: Comparative cost of farm operation and percentage change in the Northern zones

Zones	Maize			Millet			Rice			Sorghum		
	CFOs (₦)		% Change	CFOs (₦)		% Change	CFOs (₦)		% Change	CFOs (₦)		% Change
	2021	2022		2021	2022		2021	2022		2021	2022	
NC	221,857	288,863	30.2	148,668	170,025	14.4	291,571	310,050	6.3	209,000	249,500	19.4
NE	202,500	273,625	35.1	120,838	192,467	59.3	261,607	292,333	11.7	128,663	174,250	35.4
NW	230,000	320,000	39.1	129,500	210,000	62.2	195,600	249,000	27.3	137,200	192,500	40.3
Regional mean	**218,119**	**294,162**	**34.9**	**133,002**	**190,830**	**43.5**	**249,592**	**283,794**	**13.7**	**158,287.7**	**205,416**	**29.8**

CFOs=Cost of farm operations

Cost of Farm Operations in the South-East zone

In 2022, the cost of farm operations (CFOs) to produce one hectare of maize in the SEZ was highest in Imo state (₦285,000), while it was lowest in Anambra state (₦150,000). The percentage increase in CFOs for producing maize from 2021 to 2022 was highest in Ebonyi State (66.7%), while it was lowest in Imo State (9.6%) (Table 5).

Furthermore, the farm operations cost of producing one hectare of rice in the SEZ recorded the highest in Ebonyi State (₦700,000), compared to Abia, Anambra and Enugu States (₦220,000). The percentage increase in CFOs for producing rice was highest in Abia State (57.1%), but lowest in Enugu State (7.7%).

The average CFOs for producing rice in the SEZ is higher (₦338,000) than that of maize (₦224,600). However, the percentage increase in CFOs for producing a hectare of maize in SEZ was higher (19%) than the increase in CFOs for producing rice (4.3%). Generally, the CFOs for producing major cereals (rice and maize) across the states in the SEZ shows a high increase (7-67%).

Table 5: Cost of farm operations in the South-east zone

	Maize			Rice		
	CFOs (₦)		%Change	CFOs (₦)		%Change
States	2021	2022		2022	2022	
Abia	110,000	160,000	45.5	140,000	220,000	57.1
Anambra	-	150,000		-	220,000	
Ebonyi	150,000	250,000	66.7	650,000	700,000	7.7
Enugu	235,000	278,000	18.3	206,000	220,000	6.8
Imo	260,000	285,000	9.6	300,000	330,000	10.0
Zonal Mean	**188,750**	**224,600**	**19.0**	**324,000**	**338,000**	**4.3**

CFOs=Cost of farm operations

Cost of Farm Operations in the South-South Zone

In 2022, the cost of farm operations (CFOs) for producing one hectare of maize in the SSZ was highest in Bayelsa state (₦460,000), while it was lowest in Delta state (₦220,000). The highest percentage increase in CFOs for producing maize was recorded in Delta State (131.2%), while Cross-river State recorded the lowest (3.8%). The CFOs for producing maize reduced by about 37% in Bayelsa State (Table 6).

Furthermore, the CFOs for producing one hectare of rice in the SSZ recorded the highest in Cross-River State (₦600,000), compared to Akwa-Ibom State (₦315,000). The percentage increase in CFOs for rice was highest in Bayelsa State (33.3%), but lowest in Edo State (4.5%).

The average CFOs for producing rice in the SSZ was higher (₦459,090) than that of maize (₦346,575). However, the percentage increase in CFOs for producing a hectare of rice was higher (36.1%) than the increase in cost of producing maize (2.5%). Generally, the CFOs for producing major cereals (rice and maize) across the states in the SSZ show a high increase (4-132%).

Table 6: Cost of farm operations in the South-South Zone

States	Maize			Rice		
	CFOs (₦)		%Change	CFOs (₦)		%Change
	2021	2022		2022	2022	
Akwa-Ibom	246,000	296,000	20.3	265,000	315,000	18.9
Bayelsa	605,000	380,000	-37.2	450,000	600,000	33.3
Cross river	443,200	460,000	3.8	-	650,450	-
Delta	94,780	220,000	132.1	-	-	-
Edo	329,785	373,450	13.2	363,763	380,000	4.5
Rivers	309,900	350,000	12.9	270,800	350,000	29.2
Zonal Mean	**338,111**	**346,575**	**2.5**	**337,391**	**459,090**	**36.1**

CFOs=Cost of farm operations

Cost of Farm Operations in the South-West Zone

The cereal crops reported for south-west zone are shown in Table 7. In 2022, the cost of farm operations (CFOs) for producing one hectare of maize in the SWZ was highest in Lagos state (₦420,000), but lowest in Osun state (₦220,000). The percentage increase in the CFOs for producing maize rose by 106.7% from 2021 to 2022 in Oyo state. In the same vein, the CFOs for producing one hectare of rice in the SWZ recorded the highest in Lagos State (₦550,000), compared to Ondo State (₦270,000). The percentage increase in CFOs in rice production was highest in Oyo State (56%), but lowest in Ogun State (14.5%). Ondo State recorded a 10% decline in CFOs for rice production.

In the SWZ, the average CFOs for rice production was higher at ₦411,560, compared to maize. Interestingly, despite rice having a higher average cost, the percentage increase in the CFOs for maize production was greater at 36.9% compared to rice's 24.3% increase. In general, the CFOs to produce major cereals (included in this report) experienced significant increases ranging from 5% to 107% across the states in the SWZ.

Table 7: Cost of farm operations in the South-West Zone

States	Maize			Rice		
	CFOs (₦)		%Change	CFOs (₦)		%Change
	2021	2022		2022	2022	
Ekiti	280,000	350,000	25.0	270,000	340,000	25.9
Lagos	400,000	420,000	5.0	400,000	550,000	37.5
Ogun	243,000	303,000	24.7	412,800	472,800	14.5
Ondo	160,000	270,000	68.8	300,000	270,000	-10.0
Osun	150,000	220,000	46.7	-	-	
Oyo	180,000	372,000	106.7	272,500	425,000	56.0
Zonal Mean	**235,500**	**322,500**	**36.9**	**331,060**	**411,560**	**24.3**

CFOs=Cost of farm operations

Comparative Cost of Farm Operations and Percentage Change in the Southern Zones

As indicated in Table 8, the average cost of farm operations (CFOs) for producing one hectare of maize across the southern zones reveals that it is costlier to produce maize in the SSZ (₦346,575) compared to the SW (₦322,500) and SE (₦224,600). As for rice, the average CFOs for producing one hectare across the southern zones reveals that it is costlier to produce rice in the SSZ (₦459,090) compared to the SW (₦411,560) and SE (₦338,000).

In the SWZ, the cost of farm operations for maize per hectare witnessed a significant increase of 36.9% from 2021 to 2022. On the other hand, the SSZ experienced the highest percentage rise in the cost of farm operations for rice, with a significant surge of 36.1 during the same period (Table 8). Overall, when comparing the different zones in the south, the SWZ exhibited the highest percentage increase in the cost of farm operations for cereals.

The average CFOs for producing rice in the south is higher (₦402,883) than maize (298,891). However, the percentage increase in CFOs for producing a hectare of rice was higher (24.3%) than maize (17.2%) (Table 8). Overall, the CFOs for producing major cereals shows a very high increase (ranging from 2.5-36.9%) across the states in the Southern region.

Table 8: Comparative cost of farm operation and percentage change in the Southern zones

Zones	Maize			Rice		
	CFOs (₦)		%Change	CFOs (₦)		%Change
	2021	2022		2021	2022	
SE	188,750	224,600	19.0	324,000	338,000	4.3
SS	338,111	346,575	2.5	337,391	459,090	36.1
SW	235,500	322,500	36.9	331,060	411,560	24.3
Regional mean	**254,120**	**298,891**	**17.2**	**330,817**	**402,883**	**21.8**

CFOs=Cost of farm operations

National Cost of Farm Operations and Percentage Change for the Production of Cereals

At the national level, the cost of farm operations is presented in Table 9. This result indicates that the cost of farm operations in the year 2022 is higher for all the crops. The mean cost of farm operations for producing a hectare of rice in Nigeria was estimated to be ₦343,339, while that of maize was ₦296,027. However, the percentage increase in the cost of farm operations for producing a hectare was higher for maize (25.4%) than rice (18.3%).

The percentage increase in the cost of farm operations for producing a hectare of maize was higher in the Northern region (34.9%) than in the Southern region (17.2%). But, for rice, the percentage increase was higher in the Southern region (21.8%) than in the Northern region (13.7%). Millet and sorghum are mainly produced in the Northern region, hence, the figures obtained in the North stand for the national

computation. The percentage increase in the cost of farm operations for producing a hectare of millet was 43.5%.

Generally, the cost of farm operations for producing cereals soared higher in 2022. This position confirmed the findings of Business Daily (2021) that the price of ploughing has gone up by 30% in the North Rift, Kenya as tractor owners pass the cost of a sharp increase in the price of diesel to farmers (Business Daily, 2021). The Furrow (2023) also lamented that Swedish farmers have experienced a 25% increase in input costs over the past years.

This position was corroborated by The Guardian (2022) which reported that since the beginning of 2022, farmers have been struggling to cope with the rising cost of inputs, a development that forced a good number of small-scale farmers to scale down their activities. The situation became worse when the planting season commenced fully – the cost of the inputs further soared and the energy crisis compounded it.

The high cost of labour made the matter worse. Farmers could not embrace the use of tractors as an alternative as the cost of hiring a tractor suddenly increased astronomically, beyond the reach of average farmers. Investigations by The Guardian showed that hiring a tractor, which costs between ₦7,000 to ₦8,000 per hour as at 2021, went for as high as ₦50,000 in 2022. This has been attributed to the cost of diesel, which rose from ₦350 to over ₦720 in 2022. According to The Guardian (2022), a Professor of Horticulture, University of Maiduguri, Abba Gambo, confirmed the development, describing the situation as a big challenge to farmers. Lamenting, He said: “What is happening now for land clearing using tractors is going beyond the means of farmers. The tractor uses diesel. Last year (2021), the hiring of a tractor was ₦7,000 per hour for a farmer to pay for his land to be ploughed and harrowed. This year, the tractor is ₦50,000 per hour. So, you now look at how the farmer can cope. “If you are talking about four hours operation, that means you are talking about ₦200, 000, there is a big challenge there”.

Daily Trust (2023) buttressed the high cost of farm operations. According to the publication, farmers reduce farm size over cost of inputs, hiring tractors as they pay as much as ₦70,000 per hectare to use a tractor in Lavun LGA of Niger State, while the cost of hiring tractor per day in Yelwan Shendam LGA was as high as ₦120,000 per day. Similarly, the cost of hiring a tractor has jumped to ₦45,000 per day from the government agency in Kogi State, Nigeria.

Table 9: National mean cost of farm operations and percentage change for producing major cereals

Crop		Year	Mean Cost of Farm Operations (₦)		
			Northern Region	Southern Region	National Mean Cost of Farm
Maize		2021	218,119	254,120	236,120
		2022	294,163	297,892	296,027
		%Change	**34.9**	**17.2**	**25.4**
Millet		2021	133,002	-	-
		2022	190,831	-	-
	Cost of farm operations (₦)	**%Change**	**43.5**	**-**	**-**
Rice		2021	249,593	330,817	290,205
		2022	283,794	402,883	343,339
		%Change	**13.7**	**21.8**	**18.3**
Sorghum		2021	158,288	-	-
		2022	205,417	-	-
		%Change	**29.8**	**-**	**-**

Conclusion and Recommendations

The cost of farm operations has increased substantially from 2021 to 2022. The percentage increase has been very high for all the crops across the states of Nigeria. Efficient tractor-hiring services should be made available at subsidized rates at all LGAs through public-private partnership arrangements in Nigeria.

References

Agriculture (2019). Cereals production in Nigeria: Problems, constraints and opportunities for betterment. https://extquest.home.blog/2019/06/01/cereals-production-in-nigeria-problems-constraints-and-opportunities-for-betterment/ Assessed June 22, 2023.

Business Daily, (2021). The price of ploughing has gone up by 30% in the North Rift. Tuesday March 23. https://www.businessdailyafrica.com/bd/news/counties/ploughing-increase-by-30pc-on-expensive-fuel-3332026 Assessed July 7, 2023.

Daily Trust (2023). Farmers Reduce Farm Size Over Cost Of Inputs, Hiring Tractors, Thu, 8 Jun https://dailytrust.com/farmers-reduce-farm-size-over-cost-of-inputs-hiring-tractors/ Assessed July 7, 2023.

Gyimah-Brempong, K., Johnson, M. & Takeshima, H. (2016). The Nigerian Rice Economy: Policy Options for Transforming Production, Marketing, and Trade. Philadelphia. University of Pennsylvania Press.

Issa, F.O., Atala, T. K., Akpoko, J. G. & Sanni, S. A. (2015). Adoption of recommended agrochemical practices among crop farmers in Kaduna and Ondo States, Nigeria. *Journal of Agricultural Extension.* 19(1): 132 – 144. Available at: http://dx.doi.org/10.4314.jae.v19i1.12

Ismaila, U., Gana, A. S., Tswanya, N. M. & Dogara, D. (2010). Cereals production in Nigeria: Problems, constraints and opportunities for betterment. *African Journal of Agricultural Research*, 5(12), 1341-1350.

Muhammad, A. N., Shu'aib, A. U. & Abdu, Z. (2021). Macroeconomic factors: Cereal Grains Output and Prices in Nigeria. International Journal of Research and Scientific Innovation (IJRSI), VIII(III), 46-49.

NATION (2020). High diesel prices push up cost of ploughing farms in Kenya June 28, https://nation.africa/kenya/business/high-diesel-prices-push-up-cost-of-ploughing-farms--367334 Assessed July 7, 2023.

National Agricultural Extension and Research Liaison Services (NAERLS) and Federal Ministry of Agriculture and Rural Development (FMARD), (2021). *National report of wet season agricultural performance survey in Nigeria.* NAERLS Press. Pp 338.

Nigerian Tribune (2023). How rising cost of grains, inflation, climate change, others threaten Nigeria's food sufficiency, security drive. January 9. https://tribuneonlineng.com/how-rising-cost-of-grains-inflation-climate-change-others-threaten-nigerias-food-sufficiency-security-drive/ Assessed June 22, 2023.

Premium Times (2021). SPECIAL REPORT: How prices of rice, other cereals in Nigeria doubled in one year. June 24. https://www.premiumtimesng.com/news/headlines/475038-special-report-how-prices-of-rice-other-cereals-in-nigeria-doubled-in-one-year.html?tztc=1 Assessed June 22, 2023.

Samuel, P. (2020). Analysis of price fluctuation for cereals in Maiduguri metropolitant council, Borno state, Nigeria. *Journal of Agripreneurship and Sustainable Development (JASD),* 3(2), 73-79.

Sanchi, I. D., Alhassan, Y. J. & Sabo, A. Y. (2022). Rising Costs of Farm Inputs and its Implication on 2022 Wet Season Farming in Northwest sub region of Nigeria. *Direct Research Journal of Agriculture and Food Science*, 10(5), 144-150.

Shani B.B. and Musa A. (2021). The effect of mechanization on labour employment and cropland expansion in northern Nigeria. *Agro-Science,* 20 (3), 24-29. DOI: https://dx.doi.org/10.4314/as.v20i3.4

Takeshima, H. (2016) Market imperfections for tractor service provision in Nigeria: International perspectives and empirical evidence. *IFPRI-NSSP Working Paper* 32. Pp 34.

Takeshima, H., A. Nin Pratt, and X. Diao. 2013. Agricultural Mechanization Patterns in Nigeria: Insights from Farm House-hold Typology and Agricultural Household Model Simulation. IFPRI Discussion Paper 01291. Washington, DC: International Food Policy Research Institute.

The FURROW (2023). Farmers are taking measures to offset high costs. *The John Deere Magazine,* February https://thefurrow.co.uk/farmers-are-taking-measures-to-offset-high-costs/ Assessed July 7, 2023.

The Guardian (2022) Farmers in dire straits as costs of labour, inputs soar. 24 April https://guardian.ng/features/farmers-in-dire-straits-as-costs-of-labour-inputs-soar-2/ Assessed July 7, 2023.

The Guardian (2022). Farmers in dilemma as tractor lease hits N50, 000 per hour. 21 August. https://guardian.ng/features/agro-care/farmers-in-dilemma-as-tractor-lease-hits-n50-000-per-hour/ Assessed July 7, 2023.

Tian, X., Yi, C. F. and Yu, X. (2019). Rising cost of labor and transformations in grain production in China. *China Agricultural Economic Review,* pp16 Available at: https://www.emerald.com/insight/1756-137X.htm

Trading Economics (2023). Nigeria - Cereal production (metric Tons) https://tradingeconomics.com/nigeria/cereal-production-metric-tons-wb-data.html Assessed June 22, 2023.