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EFFECTS OF COVID-19 PANDEMIC ON TRANSPORTATION, DISTRIBUTION AND MARKETING OF AGRICULTURAL PRODUCTS IN NASARAWA STATE, NIGERIA

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ABSTRACT
Nigeria is an agrarian economy with high production of agricultural products. However, the emergence of Covid-19 disease in the country and its spread across the nation as well as the lockdown policies of the Federal and State governments has compounded the socio-economic condition of the people. It is on this premise that this study examines the effects of Covid-19 Pandemic and the lockdown policies of the government on the transportation and distribution of agricultural products in Nasarawa Eggon Local Government of Nasarawa State, Nigeria. The study adopted the survey approach applying simple random techniques with the use of a well-structured questionnaire to collect information on the effects of Covid-19 among farmers, traders and transporters of agricultural products in the study area. Both descriptive and regression statistics were used to achieve the collected data. Results of the study shows that Covid-19 pandemic significantly impacted transportation factors (R^2=0.553, F=103.238, p=0.000), distribution factors (R^2=0.260, F=17.125, p=0.000), and marketing factors (R^2=0.559, F=61.871, p=0.000) of agricultural products in the study area. It is therefore concluded that the Covid-19 pandemic and lockdown policies significantly impacted the transportation and distribution of agriculture in the study area. Therefore, there is an urgent need to curb the menace and for the governments to provide palliative for the people.

Keywords: Agriculture, Covid-19, Distribution, Marketing, Product, Transportation

INTRODUCTION
The Covid-19 pandemic is a devastating world health challenge that has adversely impacted the global economy in direct and indirect ways, mainly through the necessary measures adopted to cut the spreading effects of the disease. These impacts have been significantly felt on the agricultural sectors of nations around the world (FAO & SDGs (2020); Gray, (2020); Ilesanmi, *et al*. (2021); Liverpool-Tasie *et al*. (2020); Nchanji, Lutomia, Chirwa, Templer, Rubyogo, and Onyango (2021). The transportation and distribution of agricultural products have faced challenging issues before now, especially in developing countries like Nigeria (Ajiboye & Afolayan, 2009, Ajiboye, 2011, Ojekunle *et al*. (2020). The

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Covid-19 pandemic and all necessary actions taken by the governments to curtail the spread of the disease also contributed to the increasing crisis bedeviling the effective supply of food products to markets and consumers (Ilesanmi *et al*., 2021), disrupting the composition and level of demand for agricultural products.

The agricultural sector is a well active sector in the Nigerian's economy. According to FAO's report, agriculture activities are the hub of the economy of most Nigerians. Agriculture has been a source of livelihood for the majority of the citizens of the country and it has seen substantial growth in recent times. Agricultural production in the country consists of crop production, livestock, forestry and fishing, which results in various cash and food crops, poultry and livestock produce, and fruits and vegetables (FAO, 2020). The majority of this agricultural production is done in the rural settlement (Afolabi *et al*., 2016, Ajiboye *et al*. 2009, Ajiboye & Olaogun, 2006), this indicates the need for accessibility. The important contributory role of transportation and mobility to the development of agricultural production are widely recognised. According to these authors (Fasina *et al*. 2021, Ajiboye & Afolayan, 2009, Ajiboye & Ayantoyinbo, 2009), transportation challenges constitute significant challenges facing the development of agriculture in Nigeria. Ilesanmi *et al*. (2021) observed that transportation has seen dark days with the advent of Covid-19 viruses, which had ripple effects in the supplies and distribution, marketing, and production of agricultural products, thus undermining its development.

In the wake of Covid-19 pandemic, there were restrictions on mobility across borders and lockdown laws contributed to the shortfalls in the distribution of agricultural products (Ghanbari Movahed *et al*. (2022). Liverpool-Tasie *et al*., 2020). The implemented travel bans in states and inter-state have significantly reduced transporting and distributing farm produce in markets. As a result, marketing activities have been imminent for many products leading to low supply and shortages in the market. Furthermore, reduced transportation and distribution have created accumulated surpluses from the farm gates, leading to storage difficulties and, for perishable products, increased spoilage (Ayanlade and Radeny, 2020). In addition, closing borders and regulating trans-boundary movement within the country has undoubtedly hampered food distribution and on-time delivery with negative impacts on agriculture development.

In combination, these effects are putting strains on the income of the farmers and the traders. Thus, also reducing food availability and meandering the stability of the agricultural sector in general. Based on this premise this paper examines Covid-19 pandemic effects on transportation, distribution, and marketing of agricultural products at Nasarawa Eggon, Nasarawa State, Nigeria.

Anything that has occurred is considered an event. Critical incident may be used to characterise the event (Frederick, Terenc and Liu, 2015), it could be shocks, crises, war, pandemics or any action which has impact on an organization or tendencies of preventing activities to be carried out. Event theory can be traced to the earliest work of Lewis (1986), Banett (1988), Kim (1970) and Lombard (1986). Covid-19 being an event, it has affected transportation, distribution and marketing of agricultural product particularly during the government directives on restrictions in mobility. Thus, Covid-19 has been considered to induce greater threat to regional food security and poverty. Therefore, this study considers the influence of Covid-19 on the effectiveness of transporting, distributing and marketing of agro-food products in Nigeria with a specific focus on Nassarawa Eggon LGA, Nassarawa State.

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METHODOLOGY

The Study Area

Nassarawa Eggon LGA has a population of around 148,405 people, according to the 2006 census. However, it is expected to grow to around 225,338 people in 2022 and with a population density of 165.8/km^2 (NPC, 2006). It is one of Nassarawa State's thirteen (13) LGAs. Nassarawa Eggon can be found between longitude 5^{0}05'E and latitude 8^{0}51'N. It has a landmass around 1,208 square kilometers. Nassarawa Eggon is bordered on the south by Lafia, north by Akwanga, east by Wamba, and west by Kokona (Figure 2 and 3).Nassarawa Eggon is divided into three districts, each with more than 40 settlements (Alongani, Mada Station, and Umme districts). The Eggons are the most significant settlers in the settlements, while other ethnic groups such as the Alagos, Madas, and Hausas are also present. Farmers and traders make up the occupation of the majority of the inhabitants in the area. Sorghum, maize, yam, rice, cassava, and sweet potato are common crops, while mango, cashew, guava, orange, and palms are the most common tree crops. Nassarawa Eggon has a tropical climate with rainy and dry seasons. The annual rainfall averages between 180 and 200 millimeters. Plant agriculture, animal grazing, fishing, and forestry are all possible due to the climate, soil type, and hydrology of the area.

In order to assess the influence of Covid-19 on transportation and physical distribution of agricultural products, the study employed a quantitative research method using a survey design. A structured questionnaire was used as the data collection instrument in the study. The test and re-test methods were used to determine the reliability of the instrument. Respondents were self-administered the study questionnaires. The study area consists of 42 villages, and ten villages were systematically selected for these studies. The villages were selected in a way to have an even covered of the study area

Furthermore, 100 respondents were randomly selected from the selected ten villages. The respondents consist of farmers (50), traders (25) and transporters (25). The Likert Scale was used to calculate on a scale of 1 to 5 to collect quantitative responses (where; 1-no impact; 2-minor impact; 3-mild impact; 4-moderate impact; and 5-major impact). This is to measure the impact of Covid-19 on the transportation and distribution of agricultural products in the study area. A mean score of 3.0 was determined from the aggregate score of the Likert scale. Thus, a variable score of 3.0 and above was considered highly impacted and a score below 3.0 is considered less impacted. The linear relationship between the variables was measured using the multiple regression analysis.

The regression model was conceptualised as:

$$Y = f(x_1 + x_2 + x_3 + x_4) + e \qquad \text{Eqn.1}$$

Where;

Y = Transportation of agricultural products

x_1 = Cost of transportation,

x_2 = Cost of fuel,

x_3 = Accessibility to other localities, and

x_4 = Availability of transport services

e= error terms

Equation 1 above is now made operational in the form of a regression

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e \qquad \ldots \text{Eqn. 2}$$

Where Y represents the dependent variable, x_1, x_2, x_3, x_4 represents the independent variables, b_0, b_1, b_2, b_4 represents regression constants and e represents the residual error.

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The Statistical Package for Social Sciences (SPSS) computer software version 23 was used for the analysis

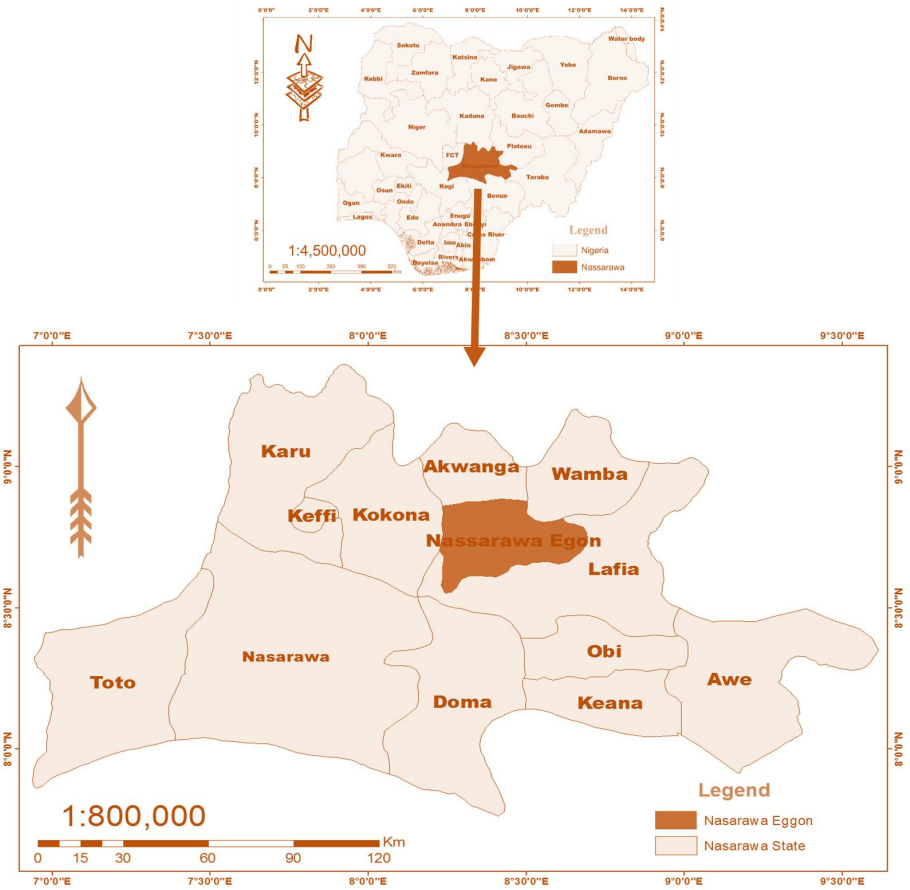

Figure 1: The Nigeria Map showing Nassarawa State and Nassarawa-Eggon LGA

RESULTS AND DISCUSSION

Demographic and Socio-Economic Characteristics of Respondents

Age, marital status, sex, and years of experience are the socioeconomic characteristics of respondents discussed in this section as shown in Table 1. Furthermore, the survey analysis revealed that 132 of the respondents, or 66 %, are male, while 68 of the respondents, or 34 %, are female. Male respondents were the majority, as presented in Table 1.

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Table 1: Demographic Profile of the Respondents

Variables	Frequency	Percentage
Sex		
Male	132	66
Female	68	34
Total	200	100
Age		
Below 25	12	6
25 – 35	34	17
36 – 45	80	40
46 – 55	50	25
Above 55	24	12
Total	200	100
Marital Status		
Married	176	88
Single	24	12
Total	200	100
Years of Experience		
< 5	16	8
5 – 10	20	10
10 – 15	74	37
15 – 20	54	27
> 20	36	18
Total	**200**	**100**

Source: Authors' Field Survey

According to the survey, only 6% (12 respondents) are under the age of 25, 17% (34 respondents) are between 25-35 years of age, 40% (80 respondents) are between 36-45 years of age. Between 46 to 55 years of age are 50 respondents representing 25% and 24 respondents (12%) are 55 years and above. Therefore, the bulk of those respondents fall within ages 36 and 45 years, while a small number are under 25 years of age.

In addition, Table 1 shows the marital status of respondents. 176 of the respondents (88%) are married and the single are just 24 respondents (12%). This indicates that respondents who are married are more compared to those not married. On the years of experience in agriculture practice, the analysis of the field survey from the study area shows that 16 respondents representing 8% have less than 5 years of experience in agriculture (i.e. farming, trading or transporting).

In comparison, 20 respondents representing 10% have years of experience between 5 – 10 years, 74 respondents representing 37% have up to 10 – 15 years of experience, 54 respondents representing 27% have been engaging in the agriculture sector for the last 15 – 20 years, while 36 respondents (18% of those polled) had working experience of more than 20 years. It can be inferred that large numbers of the respondents have relative years of working experience as farmers. About 10 -15 years (37%) and they were followed by those with about 15 – 20 (27%) working years while those with experience above 20 years (18%). Furthermore, those with 5-10 years working experience are 10 %, and those with less than 5 years constituting the minority.

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The Impact of Covid-19 Pandemic on Agricultural Products

In this section, questions were posed to evaluate the impact of Covid-19 pandemic on the transportation, distribution and marketing of agricultural products in the study area. From the questions asked, 15 variables were drawn for measurement (Table 2).

Table 2: Influencing Factors to the Transportation, Distribution and Marketing of Agricultural Products

	Variable
I_1	**Overall transportation of agricultural products**
I_2	Cost of transportation
I_3	Cost of fuel
I_4	Accessibility to other localities
I_5	Availability of transport services
I_6	**Overall distribution of agricultural products**
I_7	Frequency of distribution
I_8	Spoilage rate of agricultural products
I_9	Product accessibility
I_{10}	Access to storage facilities
I_{11}	**Overall marketing of agricultural products**
I_{12}	Accessibility to markets
I_{13}	Price of agricultural products
I_{14}	Demand for agricultural products
I_{15}	Availability of products in the market

Transportation

To evaluate the effect of Covid-19 Pandemic on the transportation of agricultural products in the study area, five (5) variables from the 15 variables were used as shown in Table 3.

Table 3: Effect of Covid-19 Pandemic on Transportation of Agricultural Products

How has the Covid-19 pandemic impacted	N	Min	Max	Mean	Std. Dev.
I_1 - Overall transportation of agricultural products	200	2.00	5.00	4.56	.872
I_2 - Cost of transportation	200	2.00	5.00	3.93	.927
I_3 - Cost of fuel	200	1.00	5.00	3.00	1.418
I_4 - Accessibility to other localities	200	2.00	5.00	4.27	1.105
I_5 - Availability of transport services	200	3.00	5.00	3.99	.980
Valid N (listwise)	**200**				

Source: *Authors' Field Survey*

From the result in Table 2, I_1 – overall transportation of agricultural products (Mean=4.56, Std. Dev=0.872), I_2 cost of transportation (Mean=3.93, Std. Dev.=0.927), I_3 – cost of fuel (Mean=3.00, Std. Dev.=1.418), I_4 – accessibility to other localities (Mean=4.27, Std. Dev.=1.105), and I_5 – availability of transport services (Mean=3.99, Std. Dev.=0.980) were all considered by the respondents to be highly impacted by the Covid-19 Pandemic. This implies that the effectiveness of the transportation of agricultural products in Nassarawa State has been adversely affected by the Covid-19 pandemic because the vehicles to carry the products are not available and where they are available, there are not sufficient fuel to buy. Thereby increasing the cost of transportation of labour, farm in-puts, and agricultural products from one area to another. This therefore affect the cost of selling and buying agricultural products to be high in the study area (Ajiboye, 2023, Ojekunle *et a*l 2020).

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To further evaluate the effect of Covid-19 pandemic on the transportation of agricultural products in the study area, the statistical relationship between the overall transportation and cost of transportation, cost of fuel, accessibility and availability of transport services were determined. This was done by carrying out a multiple regression analysis. The results of the regression are as presented in Table 4 and Table 5.

Table 4: Model Summary for Effect of Covid-19 Pandemic on the Transportation of Agricultural Products

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	.744[a]	.553	.544	.58869
F=60.380, p=.000				

a. Predictors: (Constant), Availability of transport services, Cost of transportation, Cost of fuel, Accessibility

Source: Authors Field Survey

From Table 4, the R-square for the model indicates that 55.3% of variations in the transportation of agricultural products in the study area are explained by the variables; cost of transportation, cost of fuel, accessibility, and availability of transport services. The model is said to be statistically significant since the p value is less than the 5% confidence level. This implies that a significant statistical relationship exist between the transportation of agricultural products and the impact of Covid-19 pandemic on the cost of transportation, cost of fuel, accessibility to other agricultural localities, and availability of transport services.

Table 5: Regression Coefficients[a] for Transportation Model

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	7.700	.498		15.472	.000
Cost of transportation	.457	.048	.486	9.604	.000
Cost of fuel	-.449	.054	-.729	-8.285	.000
Accessibility to other localities	-.484	.070	-.614	-6.957	.000
Availability of transport services	-.382	.062	-.429	-6.121	.000

a. Dependent Variable: Overall transportation of agricultural products

Source: *Authors Field Survey*

Table 5 shows the regression coefficients for the transportation model. The model is therefore expressed as:

Transportation = 7.7 + 0.457(cost of transportation) – 0.449(cost of fuel) – 0.484(accessibility) – 0.382 (availability of transport services)
…Eqn. 3

This result shows that all the underlying factors; cost of transportation (β=0.457, *p*=.000), cost of fuel (β=-0.457, *p*=.000), accessibility to other localities (β=-0.457, *p*=.000), and availability of transport services (β=-0.457, *p*=.000), significantly affects the overall transportation of agricultural products in the study area. It can therefore be deduced that, when transportation factors such as cost of transportation, cost of fuel, accessibility to areas, and availability of transportation services are adversely affected such as in the case of the Covid-19 pandemic the overall effectiveness of the transportation of agricultural products will be adversely affected as well.

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Summarily, the farmers and traders are faced with the challenge of decreasing in the availability of transportation services by transporters. This is due to the stringent measures of lockdown enforced by the government in order to curb the spread of the Covid-19 virus. This has limited the farmers and traders ability to access transportation services to ensure the flow of their farm produce from farms to stores and to the markets. The Covid-19 Pandemic and the lockdown measures have also impacted the accessibility of localities by farmers and traders due to lack of transport services. Transportation cost has increased as well as fuel cost making it more challenging to access transportation needs, thus, limiting product access. The results collaborate the studies of FAO (2021), Tetra Tech International Development (2020). ,

Distribution of Agricultural Products

To evaluate the effect of Covid-19 pandemic on the distribution of agricultural products in the study area, five (5) variables from the 15 variables were used as shown in Table 6.

Table 6: Effect of Covid-19 pandemic on the distribution of agricultural products

How has the Covid-19 Pandemic impacted	N	Min	Max	Mean	Std. Dev.
I_6 – Overall distribution of agricultural products	200	4.00	5.00	4.33	.470
I_7 – Frequency of distribution	200	3.00	5.00	4.47	.749
I_8 – Product spoilage	200	1.00	5.00	3.51	1.322
I_9 – Product accessibility	200	1.00	5.00	4.00	1.416
I_{10} – Access to storage facilities	200	1.00	5.00	3.58	1.242
Valid N (listwise)	**200**				

Source: Authors Field Survey

From the result in Table 6, I_6 – overall distribution of agricultural products (Mean=4.33, Std. Dev.=0.470), I_7– frequency of distribution (Mean=4.47, Std. Dev.=0.749), I_8 – product spoilage (Mean=3.51, Std. Dev.=1.322), I_9 – product accessibility (Mean=4.00, Std. Dev.=1.416), and I_{10} – access to storage facilities (Mean=3.58, Std. Dev.=1.242), with mean scores above 3.0 were all considered by the respondents to be highly impacted by the Covid-19 Pandemic. This implies that the effectiveness of the distribution of agricultural products in Nasarawa State has been adversely affected by the Covid-19 pandemic.

Further, the multiple regression model was used to predict the effects or contribution of the 4 underlying factors (frequency of distribution, spoilage rate of agricultural products, product accessibility, and access to storage facilities) on the overall distribution of agriculture of agricultural products in the study area. The regression model was conceptualised as:

$$Y = f(x_1 + x_2 + x_3 + x_4) + e \quad \text{…Eqn. 4}$$

Where;

Y = Distribution of agricultural products

x_1 = frequency of distribution,

x_2= product spoilage,

x_3 = product accessibility, and

x_4 = access to storage facilities

Equation 4 above is now made operational in the form of a regression

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e \quad \text{…Eqn. 5}$$

Where Y represents the dependent variable, x_1, x_2, x_3, x_4 represents the independent variables, b_0, b_1, b_2, b_4 represents regression constants and e represents the residual error.

The results of the regression are presented in Table 7 and Table 8.

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Table 7: Model Summary for effect of Covid-19 pandemic on the distribution of agricultural products

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	.510[a]	.260	.245	.40805
F=17.125, p=.000				

a. Predictors: (Constant), frequency of distribution, product spoilage, product accessibility, access to storage facilities

Source: *Authors Field Survey*

From Table 7, the R-square for the model indicates that 26% of variations in the distribution of agricultural products in the study area are explained by the variables frequency of distribution, product spoilage, product accessibility, access to storage facilities. Therefore the model is statistically significant (F = 17.125, p = .000), since $p < 0.001$ at 0.05 alpha level. This implies that a significant statistical relationship exist between the distribution of agricultural products and the impact of Covid-19 pandemic on the frequency of distribution, spoilage rate of agricultural products, product accessibility, access to storage facilities.

Table 8: Regression Coefficients[a]

Model	Unstandardised Coefficients		Standardised Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	5.189	.208		24.973	.000
Frequency of distribution	.036	.039	.057	.912	.363
Product spoilage	-.049	.022	-.137	-2.202	.029
Product accessibility	-.076	.021	-.230	-3.705	.000
Access to storage facilities	-.154	.024	-.407	-6.461	.000

a. Dependent Variable: Overall transportation of agricultural products

Source: *Authors Field Survey*

Table 8 shows the regression coefficients for the transportation model. The model is therefore expressed as:

Distribution = 5.189 + 0.036(frequency of distribution) – 0.049(product spoilage)– 0.076(product accessibility) – 0.154(access to storage facilities) … Eqn. 6

This result shows that the underlying factors; frequency of distribution (β=0.036, p=.363) and product spoilage (β=-0.049, p=.029) do not significantly impact the overall distribution of agricultural products in the study area, while product accessibility (β=-0.076, p=.000), and access to storage facilities (β=-0.154, p=.000), significantly affects the overall distribution of agricultural products in the study area. Nevertheless, it can still be deduced that, when distribution factors such as frequency of distribution, product spoilage, product accessibility, access to storage facilities are adversely affected such as in the case of the Covid-19 Pandemic the overall effectiveness of the distribution of agricultural products will be adversely affected as well.

In summary Covid-19 Pandemic have some reasonable impact on the distribution of agricultural products in the study area. Most farmers have experienced a decline in the frequency of their distribution during the pandemic period reporting that they do not supply farm produce as often as they use to. This has increased the demand for storage since markets were closed and distribution is on hold; demand for storage has increased because products in the store have not been sold, and there is a need for a new harvest to be stored. Distribution

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rates have also reduced due to the lack of access to the store location due to lockdown measures. In addition, storehouses have become difficult to access for the lack of transportation services, which has impacted the adequate flow of products from stores to markets and from farms to stores. Consequently, spoilage of products occurs primarily in the storehouses, which are major distribution centres, according to Ojekunle *et al*. (2020).

Marketing of Agricultural Products

To evaluate the effect of Covid-19 pandemic on the marketing of agricultural products in the study area, Five (5) variables from the 15 variables were also used as shown in Table 9. From the result in Table 9, I_{11} – overall marketing of agricultural products (Mean=3.85, Std. Dev.=1.496), I_{12}– access to market (Mean=4.54, Std. Dev.=0.945), I_{13} – price of products (Mean=3.43, Std. Dev.=0.773), I_{14} – product demand (Mean=3.36, Std. Dev.=0.625), and I_{15} – availability of products in the market (Mean=3.30, Std. Dev.=0.567), with mean scores above 3.0 were all considered by the respondents to be highly impacted by the Covid-19 Pandemic. This implies that the marketing of agricultural products in Nasarawa State has been adversely affected by the Covid-19 pandemic.

Table 9: Effect of Covid-19 pandemic on the marketing of agricultural products

How has the Covid-19 pandemic impacted	N	Min	Max	Mean	Std. Dev.
I_{11} – Overall marketing of agricultural products	200	1.00	5.00	3.85	1.496
I_{12}– Access to market	200	2.00	5.00	4.54	.945
I_{13}– Price of products	200	3.00	5.00	3.43	.773
I_{14}– Product demand	200	2.00	5.00	3.36	.625
I_{15}– Availability of products in the market	200	3.00	5.00	3.30	.567
Valid N (listwise)	**200**				

Source: Authors Field Survey

Further, the multiple regression model was used to predict the effects or contribution of the 4 underlying factors (access to market, price of products, product demand, and availability of products in the market) on the overall marketing of agriculture of agricultural products in the study area. The regression model was conceptualized as:

$$Y = f(x_1 + x_2 + x_3 + x_4) + e \quad \text{… Eqn. 7}$$

Where:
Y = marketing of agricultural products
x_1 = access to market,
x_2 = product price,
x_3 = product demand, and
x_4 = product availability in the market

Equation 7 above is now made operational in the form of a regression

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e \quad \text{… Eqn. 8}$$

Where Y represents the dependent variable, x_1, x_2, x_3, x_4 represents the independent variables, b_0, b_1, b_2, b_4 represents regression constants and e represents the residual error.

The results of the regression are presented in Table 10 and Table 11.

Table 10: Model Summary for effect of Covid-19 pandemic on the marketing of agricultural products

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	.784[a]	.559	.550	1.00340
F=61.871, p=.000				

a. Predictors: (Constant), access to market, product price, product demand, product availability

Source: *Authors' Field Survey*

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From Table 10,the R-square for the model indicates that 55.9% of variations in the marketing of agricultural products in the study area are explained by the variables access to market, product price, product demand, product availability. Therefore the model is statistically significant (F = 61.871, p = .000), since $p < 0.001$ at 0.05 confidence level. This implies that a significant statistical relationship exist between the marketing of agricultural products and the impact of Covid-19 Pandemic on the access to market, product price, product demand, product availability.

Table 11: Regression Coefficients[a]

Model	Unstandardised Coefficients		Standardised Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	10.488	.777		13.495	.000
Access to market	-.158	.076	-.100	-2.081	.039
Product price	-1.401	.092	-.724	-15.167	.000
Product demand	.019	.114	.008	.167	.868
Product availability	-.359	.127	-.136	-2.824	.000

a. Dependent Variable: Overall transportation of agricultural products

Source: *Authors' Field Survey*

Table 11 shows the regression coefficients for the transportation model. The model is therefore expressed as:

Marketing = 10.48 – 0.158(access to market) – 1.401(product price) + 0.019(product demand) – 0.359(product availability) … Eqn. 9

This result shows that the underlying factors; access to market (β=-0.158, p=.039) and product demand (β=0.019, p=.868) do not significantly impact the overall distribution of agricultural products in the study area, while product price (β=-1.401, p=.000), and product availability in the market (β=-0.359, p=.000), significantly affects the overall distribution of agricultural products in the study area. Nevertheless, it can still be deduced that, when marketing factors such as access to market, product price, product demand, and product availability in the market are adversely affected such as in the case of the Covid-19 Pandemic the overall effectiveness of the distribution of agricultural products will be adversely affected as well.

The function of marketing is crucial for the growth and development of agriculture in any given environment (Oyetoro *et al*., 2020). However, market access has been dramatically affected as a result of the Covid-19 pandemic. During the pandemic, markets were closed, and transportation activities restricted. Farmers and traders are now finding it difficult to gain access to markets where their farm produce can be sold. These have reduced demand for the purchase of agricultural products in the study area. As a result, farm produce get spoiled especially fresh foods, and farmers lost revenue. This has negatively impacted the growth and development of agriculture in the study. Farmers and traders perceived declining products available as an influence of Covid-19 pandemic. The disrupted flow of agricultural products due to transportation and distribution factors impacted by the Covid-19 pandemic is mirrored in the study area's declining availability of food products. Hence, this limits the development of agriculture in the study area. Farmers and traders cannot sell their products for profit, and consumers cannot buy food products to meet their daily food needs.

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CONCLUSION AND RECOMMENDATION

The research has shown that Covid-19 pandemic has affected agriculture in the study area regarding transportation and distribution or marketing of products. Four major underlying factors identified were transportation, distribution, marketing, and product availability. Farmers and traders experienced difficulties and effectively carried out these underlying factors, resulting in lost products and revenue with attendant effect on all the stakeholders in the food supply networks. Key findings from the study are:

i. A positive relationship was established between the response variable (transportation) and the cost of transportation, while cost of fuel, accessibility and availability of transport services depict an inverse relationship
ii. All the investigated variables have negative relationship with distribution except frequency of distribution that has a positive relationship.
iii. All the investigated indices have inverse relationships with the response variable (marketing) except product demand that has a 1.9% influence on marketing for a unit change in product demand.

This study contributes to understanding these concerns by outlining the associated factors for proper consideration and implementations.

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