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HOW COVID-19 PANDEMIC OBSTRUCTED MAIZE PRODUCTION ACTIVITIES IN NIGER STATE OF NIGERIA

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ABSTRACT
The fight against Covid-19 remains, as it continued to mutate into highly transmittable omicron variants. This study addresses the challenges faced by maize farmers in Niger state of Nigeria during and immediately after the early 2020 lockdown to offer recommendations on how to reduce the negative impact of the new variants containment policies. Primary data were collected using a structured questionnaire. A simple random sampling technique was used in selecting household after which 248 maize farmers was extracted from the data. It was observed that the farmers were enlightened on the issues of Covid-19 and there is no significant difference between the elderly and the young farmers on adherence to the safety rules of Covid-19. The major obstruction to the production chain during the lockdown was the marketing of the maize crop, followed by the difficulties in accessing inputs for next production season. Despite the challenges, over half of the respondents chose to increase their farm production scale for the next season to take advantage of the increasing prices. The findings in this study have policy implication on maize farmers and other stakeholders in the value chain.

Keywords: Maize, Production activities, Covid-19 lockdown, Omicron variant, Niger State.

INTRODUCTION
Maize is a staple food in Nigeria that is virtually grown in every State in the country. As at early 2021, maize alone accounted for 5.9% out of the 22.4% of agricultural contribution to GDP (BABBAN-GONA, 2022). As one of the most consumed staple grains in the country, about 15% of it is consumed locally by households, 25% by beverage companies and over 60% are used in the poultry industry of the country (News Agency of Nigeria [NAN], 2021). Thus, a change in maize supply/price have direct impact in the supply and price of poultry products (Remi, 2021; Sani, 2015). The economic importance of maize crop in Nigeria cannot be overemphasized enough as it touches the lives of low, medium and high socio-economic classes in the country.

According to Food and Agriculture Organization (FAO, 2021), Nigeria is the second largest maize producer in Africa with over 12 million tons after South Africa producing about 15.3 million tons. The third largest maize producing country in Africa is Ethiopia producing about 10.02 million tons. These three countries alone account for about 41.2% of maize production in Africa (FAO, 2021). Despite being the second largest maize producer in Africa, Nigeria's domestic demand outweighs supply leaving a deficit of over 279,000 tons (FAO, 2021), consequently, the need for importation (United State Department of Agriculture [USDA], 2012). However, the Nigerian government attached importance to local production of maize to extent of banning it importation. In early 2020, the government imposed banned on maize importation (Central Bank of Nigeria [CBN], 2020) contrary to USDA suggestion. The ideal motive is to boost domestic production rather than over relying on importation. According to studies (Abubakar & Sule, 2019; Olaniyan, 2015; Iken & Amusa, 2004), Nigeria

has what is takes to balance its domestic demand and supply, and even export maize to other countries but the subsector faces challenges that hinders this goal (USDA, 2012; Ojo, 2003).

The advent of Covid-19 has reopened the scares in many sectors of the economy around the world. It is no longer the question of "if" but "how" and to "what" extent has the pandemic affected or intensify the pre-existing challenges faced in the maize subsector. The study area, Niger State is one of the top maize-producing States in Nigeria. Production in the context of this study is the combination of various resources in order to make commodity for consumers. Maize production thus, is the cultivation, harvesting, storing and marketing of maize for consumption. Hence, production is incomplete until it gets to the final consumer. Farming activities determines yield and quality; storage technology determining wastage and quality, marketing determining profitability and consequently motivation to continue farming. All these channels in production are paramount to attaining food security as it affects the availability, accessibility, affordability, stability and utilization of maize.

A nationwide lockdown was imposed in Nigeria on 27th April 2020 as a result of increasing the cases of infected around the country especially in the cities (NCDC, 2020). Although more cases were seen in the cities, the implementation of the lockdown extended to the rural regions which threatens food security. Few studies have been carried out in Niger State on Covid-19 and fewer on the effect of Covid-19 on agricultural sector. While some concentrated on the effect on general prices (Adewopo *et al*, 2021; Baladina *et al*., 2021), some focused-on health matters (Aniche *et al*., 2021; Ahmed *et al*., 2020), education (Obiakor & Adedeji, 2020). The fight against corona virus continues even after the lockdown. As the new mutated corona virus called omicron variants emerged, this cause uncertainties in policies that may affect production activities. This study embarks on an empirical study detailing of the key maize production activities that were affected by Covid-19 containment policies.

The study examined the challenges faced by maize farmers in Niger State of Nigeria. The main objective is to highlights the major disruption in farming activities during and immediately after the 2020 Covid-19 lockdown, then recommend policy that can reduce the impact of the imminent omicron variant containment policies. The following research questions will be investigated: were the farmers abiding by the Covid-19 safety protocols? How did 2020 lockdown disrupt maize farmers production activities? Which activity did the lockdown have most impact on? What were the responses of the maize farmers towards the disruptions? Are the impediments to production activities similar in other literatures? The aim is to addresses the challenges faced by maize crop farmers that can reduce the impact of the new omicron variant threat. Specific objectives of the study include: (1) to examine the farmers level of awareness of Covid-19, (2) to identify the production activities of the maize farmers and the area majorly affected by the lockdown, (3) to examine the response of the farmers towards the challenges of the lockdown and suggest measures for improvement. The dearth of literature on the effect of Covid-19 on specific grain in the study area and the new threat from the mutated corona virus necessitated the look onto how the pandemic lockdown obstructed the production activities of maize to recommend areas to improve upon in order to have minimal negative impact.

MATERIALS AND METHODS

The Study Area

The study area for this research is Niger State, Nigeria. Niger State is in the west-central region of Nigeria. The populace (85%) is predominantly farmers engaged in series of food and cash crop farming, and livestock agriculture. Niger State is among the second largest maize

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producers in Nigeria after Kaduna State. The State is divided into three (3) ecological zones (1, 2 and 3) and each zone produces a competitive maize yield (Figure 1).

Sampling Procedure

Using simple random sampling technique, over 300 households were interviewed across the State out of which 248 maize farmers were extracted. The selected respondents are from nine (9) local government areas. Figure 1 above depicts the Local Government Areas in each zone under radar for this study. Zone 1: Agaie, Bida, Katcha and Lapai; Zone 2: Bosso, Rafi and Tafa; and Zone 3: Borgu and Kontagora.

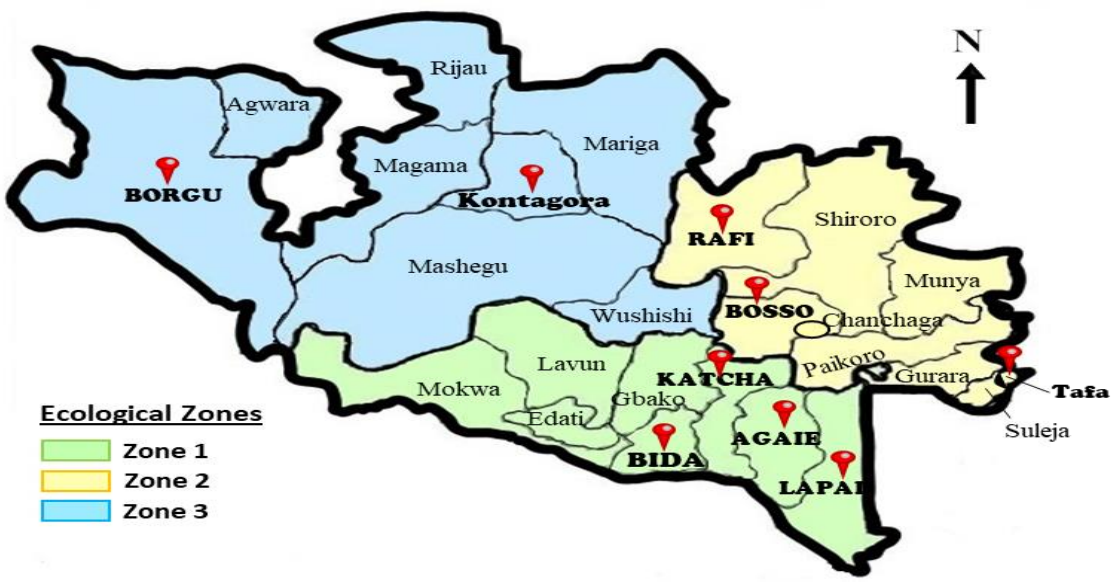

Figure 1: *Surveyed Local Government Areas*

Method of Data Collection

Data were collected during and immediately after Covid-19 lockdown using a structured questionnaire (10%, paper and 90% online) this was adopted to reduce risk of infection through physical contact using paper questionnaire.

Method of Data Analysis

Analysis: a descriptive cross-sectional study was used to attempt answering the research questions of the study following the listed objectives. The use of diagrams, table, percentile and cross-referencing with related literatures. Student's T-test was also used to compare the aged (greater than or equal to 50 years) and young (less than 50 years of age) respondents in relation to their adherence to safety rules on Covid-19.

RESULTS AND DISCUSSION

Socio-economic Characteristic of the Farmers

Table 1 presents descriptive statistics of the socioeconomic characteristics of the maize farmers in the study area. The average age of the farmers is about 35 years where about 63.7% are under the age 36 year and 36.3% above 35 years. The least years of education attained by the farmers is about 3 years. Majority of the farmers 75% have close to 12 years and above of formal education. The implication of this is the swift adoption of policy and technology by the farmers since majority can read, write and comprehend information passed.

Extended family system and having many children is a common practice in the study area. According to the survey, the mean household size is 10 persons. This is usually an advantage

to cheap labor. The largest household size is 25 persons. Majority of the farmers (82%) interviewed resides in rural areas which explains the fact that the major occupation of the respondents is farming (about 64%). Accordingly, the remaining 36% of the farmers have maize farming as their secondary source of income. Their secondary source of income includes self-employed (17.7%), salary earners (9.3%), professionals (5.7%), daily wage earners (3.2%) and a single retiree.

Table 1: Socio-economic characteristics of the maize farmers

Category	**Mean**	**Min.**	**Max.**
Age (years)	34.8	18	85
Education (years)	11.6	3	20
Household size	10	1	25
	Group	**Frequency**	**Percentage**
Marital status	Single	74	29.8
	Married	173	69.8
	Widower	1	0.4
Gender	Male	237	95.6
	Female	11	4.4
Residency	Rural	203	81.8
	Urban	45	18.2
Occupation	Farming	158	63.7
	Self employed	44	17.7
	Salary earner	23	9.3
	Professional	14	5.7
	Daily wages	8	3.2
	Retiree	1	0.4

Source: Field survey data 2020/2021

The socio-economic characteristics of the farmers played an important role in understanding the disruption in the production activities of the maize farmers. Healthwise, research has shown that large cases of the infected are seen in the elderly in high-income countries. The cases in the low-income countries faced some challenges in terms of availability of data (infected/death cases). hence, it is unclear if there is significant difference between the high- and low-income economies (Dante *et al.*, 2021; Kani *et al.*, 2020). Drawing from the infectious rate on the aged group, are the aged farmers (50 year and above) in the study area adhering to the safety rules than the younger farmers? Table 2 presents the percentage response of maize farmers to some basic safety rules of preventing Covid-19 infection.

Given the level of literacy shown in Table 1, it is no surprise majority of the farmers are aware and comprehend the dangers of the Covid-19 (Table 2). Adherence compared to awareness is totally a different dimension. These are some of the unpredictable dynamics of human. For instance, some farmers may be aware of the dangers yet do not observe the safety rules of Covid-19. A 5-point Likert scale was introduced to the farmers in response to how often they wear facemask as a method of protection against infection from Covid-19. Zero (0) as "do not wear" and five (5) as "always wear". About 45.7% of the farmers responded wearing facemasks often and always, 31.4% occasionally wear. Despite the danger of the virus, some farmers (5.6%) do not wear facemask and others (17.3%) rarely wear. In response to the question of who adhere to the safety rule, the age or the young farmers, this study conducted a student's t-test comparing the adherence of the two age groups to safety rules of Covid-19.

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Table 2: Awareness of the dangers of Covid-19 among farmers

Awareness	Response	Frequency	Percentage
Do you believe Covid-19 and its dangers exist?	No	17	6.8
	Yes	231	93.
Do you believe the virus can infect you &/or your family?	No	31	12.5
	Yes	217	87.5
Have you had any one you know infected by the virus?	No	131	52.8
	Yes	117	47.2
How often do you wear facemask?	Do not wear	14	5.6
	Rarely	43	17.3
	Occasionally	78	31.4
	Often	53	21.4
	Always	60	24.2

Source: Field survey data 2020/2021

The result (Table 3) fails to reject the null hypothesis that there is no difference in the mean score between the aged and young farmers in terms of adhering to rules of wearing facemask as the two-sided alternative hypothesis (H_a: difference $\neq 0$) which states that there is difference between the group has a p-value of 0.2818 suggesting that there is no enough evidence to reject the null hypothesis. In other words, there is significant evidence to show that there is difference between the two age groups.

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Table 3: t-Test comparing adherence to safety rules between two age groups

Variables	**Obs**	**Mean**	**Std. Err.**	**Std. Dev.**
Aged farmers (≥50 years)	25	2.12	0.2847221	1.42361
Young farmers (<50 years)	223	2.443946	0.0777217	1.160633
difference		-.3239462	0. 2951395	
t-value = -1.0976			95% confidence interval	
Satterthwaite's degrees of freedom = 27.6933			H_o difference = 0	
H_a: difference ≠ 0 (p-value = 0.1409)				
H_a: difference < 0 (p-value = 0.2818)				
H_a: difference < 0 (p-value = 0.8591)				

Source: Field survey data 2020/2021

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The Farm Enterprises Practiced by the Maize Farmers

Multiple farms and intercropping farm enterprises were practiced by the maize farmers in the study area. The former involves owning multiple lands/farm that are used to cultivate different crops (Table 4) while the latter, in some cases called mix cropping (Table 5) involves cultivation of two or more crops on the same land/farm simultaneously. For sustainability, Kariaga (2004) opined that maize should be intercropped with other mutual benefiting crops especially the leguminous ones. Maize is mostly intercropped with leguminous crops such as soybean, cowpea, groundnut and pigeon pea. In some cases, it is intercropped with cassava, yam, melon or vegetable (Chukwuji, 2008). Maximizing income per unit of land, labor efficiency, risk minimization, meeting protein and calorie requirements are some of the reasons/advantages of intercropping (Seran & Brintha, 2010).

Under the multiple farming system were cereal crops, leguminous crops and tubers separately cultivated on different land at relatively same period. The common cereal and tuber crops include but not limited to the combination of maize with millet, rice, yam, sorghum, coco yam, potato or cassava. On the contrary, none of the farmers in the study area intercropped maize with yam or cassava as seen in Chukwuji (2008) but rather cultivated them on separate fields. More farmers (30%) were seen to have three separate farms cultivating maize, rice and millet; and approximately 11% with two farms cultivated maize and rice. Other farm enterprise combination falls below 8%.

Table 4 also shows the intercropping (or mix cropping) system practiced by the maize farmers. According to the findings of the study, about 73% of the farmers intercropped their maize with leguminous crops such cowpea, groundnut and soybean. More of maize-groundnut and maize-cowpea farming were seen in the study area compared with maize with other leguminous crops.

Table 4: Multiple farm system

Crop	Frequency	Percentage
Double crops		
Maize and Millet	18	7.3
Maize and Rice	26	10.5
Maize and Yam	12	4.8
Triple crops		
Maize, Groundnut and Millet	4	1.6
Maize, Rice and Millet	75	30.2
Maize, Groundnut and Rice	4	1.6
Maize, Yam and Rice	6	2.4
Maize, Cowpea and Rice	4	1.6
Maize, Groundnut and yam	4	1.6
Mix/intercropping system		
Maize – Cowpea	73	29.4
Maize – Groundnut	84	33.9
Maize – Soybean	35	14.1

Source: Field survey data 2020/2021

Challenges During and Immediately after Covid-19 Lockdown

The results of movement of farmers during lockdown as presented in Figure 2 shows that no restriction of movement was imposed on farmers to accessing their respective farms

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especially the rural farmers (82.7%) although they still face difficulties of accessing public transport to visit distance farms or conveying products. Difficulties to accessing farms were mostly faced by the urban farmers (17.3%) or farmers close to metropolitan areas as restrictions were more pronounced in those regions due to the surge in the cases of Covid-19 infections.

In terms of inaccessibility to critical inputs, the major challenge that standout were the unavailability and inaccessibility to important inputs. The challenges on availability of labor were minimal due to the large household size in the study area (average household size of 10). Family/household labor dominates the labor used in the farm during the lockdown. On the other hand, three critical inputs (fertilizer, herbicides and pesticides) have been the complaint stressed by the farmers in the study area. Thus, Figure 2 shows the response of the maize farmers relating to the unavailability and inaccessibility of fertilizer, herbicide and pesticide during and immediately after the Covid-19 lockdown.

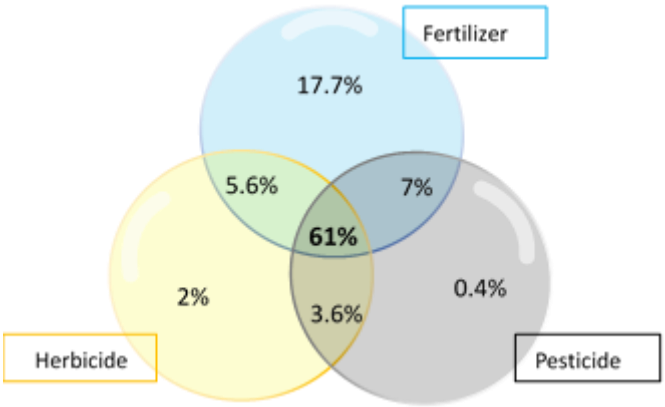

Figure 2: *Inaccessibility to critical inputs during Covid-19 lockdown*

Majority (61%) of the farmers complained about not having access to or enough fertilizer (Figure 2), herbicide and pesticides in combine due to unavailability/affordability of these critical inputs. Although this problem has been in existence prior to the advent of Covid-19 (Alabi & Abdulazeez, 2018; Abdulaleem *et al*., 2017; Abdul-Gafar *et al*., 2016; Opaluwa *et al*., 2015) so it is unclear how much impact Covid-19 have on the affordability, availability or accessibility to these inputs as there were no restriction of movement imposed on these goods. Among constraints to the three inputs, farmers where more adamant on fertilizer and about 91% of the farmers reported insufficient fertilizer to their crop during and immediately after lockdown.

Table 5: Maize market

	Category	**Frequency**	**Percentage**
Buyer's approach	During lockdown	31	12.4
	Immediately after lockdown	57	22.1
Type of buyers	Consumers	74	30.3
	Retailers	30	12.3
	Wholesalers	135	55.3
	Industry/factories	5	2.1
Offered prices compared to previous harvest (immediately after lockdown)	High and moderate	48	19.3
	Lower	6	2.6

Source: Field survey data 2020/2021

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As for market for product, only 12% (Table 5) of the farmers were approached by buyers during the lockdown but immediately after lockdown (3 days) this increased to about 22%. The category of buyers that approached the farmers at farmgate include direct consumers (30%), retailers (12%), wholesalers (55%) and industry/factories (2%). The farmers (19.3%) enjoyed a comparatively high and moderate prices offered by their buyers. Only 2.6% of the farmers bitterly complained of low prices compared to previous harvests.

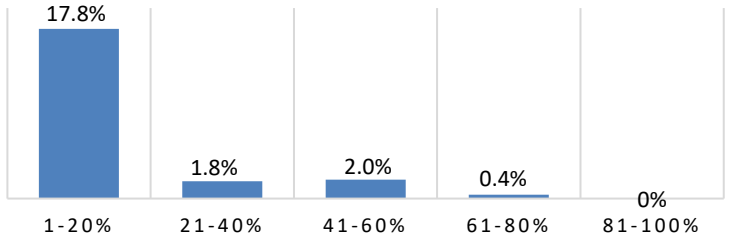

Figure 3: *Distribution of farmers by percentage of product sold*

During the lockdown, only few of the farmers were able to sell their produce because most of them were still in the early and mid-stage of their farming activities. Among the farmers that were able to sell (Figure 3), less than 3% were only able to sell 41-80%. More of the farmers (17.8%) reported selling less than 21% of their product. Some farmers opined that the low patronage is as closure of processing factories and restriction of movement of their major customers. The major consumers and industries are urban residents but with the restriction in these regions, the demand for maize products was affected.

Response of Farmers to Challenges During the Lockdown

As the farmers face these challenges during the lockdown, they must make tough decisions that will affect their livelihood. These decisions will determine the food security status of the next cropping season. Figure 4 depicts the reaction of the farmers towards the lockdown.

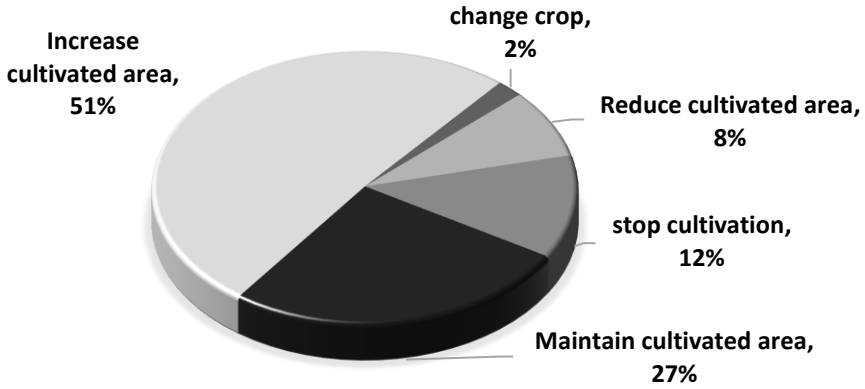

Figure 4: *Response of the farmers towards the lockdown*

The farmers were asked the decision they will make if the lockdown extends to next cropping season. Referring to Figure 4, majority (51%) of the farmers saw the lockdown as an opportunity to expand their production scale (cultivated area) believing that there will be high

demand for their product and the increasing price trend will favor them despite faced with input supply difficulties. About 27% of them responded that they will maintain their current farmland sizes. On the other hand, some fear the worst is yet to come and thus responded that they will reduce cultivated area (8%) of the respondent, while others (12%) held that they will halt farming then wait until things get better as a result of the current difficulties in accessing of inputs.

CONCLUSION AND RECOMMENDATIONS

This study investigates how maize production was obstructed during the 2020 Covid-19 lockdown to propose containment policy for the emerging omicron threat. The major production activity obstructed by the lockdown was the marketing of maize. As the major consumers are urban residents and industries, the restriction of movement in these regions has affected the demand for maize products. Another critical factor affected by the lockdown was the unavailability and inaccessibility to inputs such as fertilizer, herbicides and pesticides. Despite these challenges, majority of the farmers remained optimistic to next season production.

For containment policy such as lockdown to have minimal negative impact on maize production activities, building from the lessons of 2020 lockdown, the followings are recommended to maintain the track on self-sufficiency in maize production in this pandemic era. Re-orientation on the new mutated Covid-19 variants (omicrons) as new different omicron variants keep emerging; it is important to be proactive by update public on the severity of these threats. Market for maize crop-special maize commodity market should be introduced to allow farmers sell products to buyers. This will not just provide medium of farmers selling their product but more so protect farmers from price fluctuations in the region. Input supply channels: the availability and affordable inputs to farmers should be top priority especially fertilizer. This is to encourage the continual farming in order to curb future food shortage hence food security.

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REFERENCES

Abalu, G. O. I. & D'Silva, B. (1979). *Crop mixtures as land use strategy in Northern Nigeria.* Communication: Institute for Agricultural Research. Ahmadu Bello University Zaria, Nigeria.

Abdulaleem, M. A., Fm, O. & Kolawole, A. O. (2017). *Analysis of cost and returns on maize production among small-scale farmers in Osun State Nigeria.* Adult Education, 26, 14-4.

Abdul-Gafar, A., Xu, S. W. and Yu, W. (2016). Perceptions of Rice Farmers towards Production Constraints: Case Study of Niger State of Nigeria and Hainan of China. *Journal of Agricultural Chemistry and Environment*, 5, 20-30.

Abubakar S. & Sule A. (2019). Technical efficiency of maize production in Rijau local government of Niger State, Nigeria. *Journal of Agriculture and Veterinary Science*, 12(2), 63-71.

Adewopo, J. B., Soano-Hermosilla, G., Colen, L. & Micale, F. (2021). *Using crowd-sourced data for real-time monitoring of food prices during the COVID-19 pandemic: Insights from a pilot project in northern Nigeria.* "Global Food Security 29, 100523.

Ahmed, S. A. S., Ajisola, M., Azeem, K., Bakibinga, P., Chen, Y. F., Choudhury, N. N., &Yusuf, R. (2020). Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 issues in slum communities of Bangladesh, Kenya, Nigeria, and Pakistan: results of pre-COVID and COVID-19 lockdown stakeholder engagements. *BMJ Global Health*, 5(8), e003042.

Alabi, O. O. & Abdulazeez, I. (2018). Economics of maize (Zea mays) production in Igabi local government area, Kaduna State, Nigeria. *Gaziosmanpasa Univesitesi Ziraat Fakultesi Dergisi*, 35(3), 248-257.

Aniche, E. T., Iwuoha, V. C. & Obi K. C. (2021). Covide-19 containment policies in Nigeria: The role of conflictual federal-state relation in the fight against the pandemic. *Review of African Political Economy,* 48(169), 442-451.

BABBAN-GONA (2022). *Maize farming in Nigeria: Exciting facts you should know.* Accessed on January 3, 2011. by Adedotun Adeite. https://babbangona.com/maize-farming-in-nigeria-exciting-facts-you-should-know/#maize-farming-sector-country-gdp

Baladina, N., Sugiharto, A. N., R. & Laili, F. (2021). *Price volatility of maize and animal protein commodities in Indonesia during the COVID-19 season*. In: IOP Conference Series: Earth and Environmental Science (Vol. 803, No. 1, p. 012060). IOP Publishing.

CBN (2020). *Ban of Importation of Maize/Corn into Nigeria.* July 2020.

Chukwuji O. C. (2008). Comparative analysis of enterprise combination costs and returns in cassava-based food crop farming systems in Delta State, Nigeria. *Asian Research Publishing Network (ARPN) Journal of Agricultural and Biological Science*, 3 (4), 27-32.

Dante, M. G., Resti, C. V., Declich, S. & Putoto, G. (2021). The reported few cases and deaths of covid-19 epidemic in Africa are still data too questionable to reassure about the future of this continent. *Frontiers in Public Health*, 22.

Food and Agriculture Organization of the United Nations. (2021). *FAOSTAT statistical database*. [Rome]: FAO.

Iken, J. E. & Amusa, N. A. (2004). Maize research and production in Nigeria. *African Journal of Biotechnology*, 3(6), 302-307.

Kariaga, B. M. (2004). *Intercropping maize with cowpeas and beans for soil and water management in Western Kenya.* ISCO 2004-13th International Soil Conservation Organisation Conference (pp. Paper No. 993, 1). Brisbane: Conserving Soil and Water for Society: Sharing Solutions.

Keni, R., Alexander, A., Nayak, P. G., Madgal, J. & Nandakumar, K. (2020). Covid-19: emergence, spread, possible treatments and global burden. *Frontiers in Public Health*, 216.

NAN (2021). *Association laments high cost of maize, poultry feeds.* The Guardian. News Agency of Nigeria (NAN) Association laments high cost of maize, poultry feeds | The Guardian Nigeria News - Nigeria and World News — Nigeria — The Guardian Nigeria News – Nigeria and World News. March 26.

NCDC (2020). *Nigeria Center for Disease Control.* http://covid19.ncdc.gov.ng/advisory [Accessed: 1/01/2021.

Obiakor, T., & Adeniran, A. P. (2020). Covid-19 impending situation threatens the deepen Nigeria's education crisis.

Ojo, S. O. (2003). Factors productivity in maize production in Ondo State, Nigeria. *Journal of Applied Tropical Agriculture*, 15 (1), 57-63.

Olaniyan, A. B. (2015). Maize: Panacea for hunger in Nigeria. *African Journal of Plant Science*, 9(3), 155-174.

Opaluwa, H. I., Ali, S. O. & Ukwuteno, S. O. (2015). Perception of the constraints affecting maize production in the agricultural zones of Kogi State, North Central, Nigeria. *Asian Journal of Agricultural Extension, Economics and Sociology*, 7(2). 1-6.

Remi, F. (2021). *Poultry farmers raise alarm over high-cost maize.* Business Day. Poultry farmers raise alarm over high-cost maize. Business Day NG. January 19.

Sani, I. (2015). *Analysis of the efficiency of poultry feed production in Nigeria.* Unpublished PhD dissertation. Postgraduate school, Ahmadu Bello University, Zaria, Nigeria.

Seran, T. H. & Brintha, I. (2010). Review on maize-based intercropping. *Journal of Agronomy*, 9(3), 135-145.

USDA (2012). *Nigeria grain and feed annual 2012.* United States Department of Agriculture http://www.thebioenergysite.com/report.