
PERCEIVED EFFECTS OF COVID-19 LOCKDOWN ON THE FOOD SECURITY STATUS OF VEGETABLE FARMERS IN IMO STATE

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Abstract

The study accessed the perceived effects of COVID-19 lockdown on the food security status of vegetable farmers in Imo State, Nigeria. The study specifically ascertained their food security status before and amidst the COVID-19 lockdown; determined the output of fluted pumpkin before and amidst the COVID-19 lockdown; identified the perceived effect of COVID-19 lockdown on vegetable production and identified the measures farmers adopted to curtail the effect of COVID-19 on their food security. Multi-stage sampling procedure was used to select 100 vegetable farmers. Data were collected using questionnaire and analyzed using descriptive statistics, the core food security module and paired sample t-test. The analysis of their food security status showed that the farmers were food insecure without hunger. The result of the t-test revealed that there was a significant difference between the output of fluted pumpkin farmers before the lockdown (2.425) and amidst the lockdown (1.985) at 1% significant level. Analysis of the measures adopted by the farmers in curtailing the effects of the COVID-19 lockdown on their food security include among others established a customer base in their locality (91%), diversified into other fields (79%), The study therefore concludes that the COVID-19 lockdown had an adverse effect on the food security of vegetable farmers in Imo State. The study recommended that government and non-governmental agencies should provide support and initiatives to small scale vegetable farmers affected by the lockdown.

Keywords: *COVID-19, food security, vegetable farmers and Imo State*

Introduction

Food security has been promoted by the United Nations as the most basic human need and as a central indicator of poverty and physical wellbeing (Ojo and Adebayo, 2012). Food security is defined as a situation that exist when all people, at all-time have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preference for an active and healthy life (Food and Agriculture Organization (FAO), 2002). Food security in Nigeria is continuously being aggravated by quite a number of factors including, a decline in agricultural production, increase in population growth rate and most recently, the COVID-19 pandemic. The COVID-19 pandemic has aided in worsening the food security situation of the country, particularly impacting food supply and prices.

Corona virusis primarily transmitted from person-to-person by coming in contact with an infected person's droplets even when the infected person is not showing any signs of an infection. Symptoms of corona virus disease may appear 2 to 14 days after exposure. The symptoms include fever, cough, tiredness, loss of taste or smell, difficulty breathing, sore throat, headaches, chest pains, pink eye (conjunctivitis), runny nose etc. (National Centre for Disease Control (NCDC), 2020a).

The various countries affected by COVID- 19 have taken different measures to curtail the spread of the virus while relentless efforts are made globally to unravel

a possible cure for the disease. These measures include isolation of suspected carriers, lockdown and curfew. The federal government of Nigeria decided that the only way to reduce its spread is through lockdown. Lockdown according to Oxford Advance Dictionary is the confinement of people in their own rooms as security measure after a disturbance. It simply means the restriction of movement of people to various places of work, public centres like supermarkets, schools, churches etc and quarantines. All these restrictions certainly have a felt impact on perishable goods such as meat and vegetables. The impact is already being felt in the form of rising food prices and a shift in demand (Bedru, Oyeyemi, Ogunniyi, Hyacinth and AikiKwaw, 2020). High value items and nutritious foods are now being shifted to the background while staple and ready-to-eat foods that can be stored are now in high demand. These demand shifts are direct results of the protective measures that have been put in place to curb the disease. The supplyside has also been affected due to the nation-wide lockdown, farmers have no means of accessing their farmlands or the markets, and thus their perishable produce are left to rot in the farm.

Vegetable farming has helped farmers generate cash even from a small area of land in a short period of time (Gurung, Thapa, Gautam, Karki, and Regmi, 2016). Akpan, Aya, Essien, Akpan, and Bassey (2011) documented that vegetable were the most affordable and accessible source of micronutrients and its production is increasingly being recognized as a catalyst for rural development where majority of the people resides. Vegetables are important features of the Nigerian diet that a traditional meal

without it is assumed to be incomplete (Badmus and Yekini, 2011). This study focuses on Fluted Pumpkin Farmer in Imo State.

Fluted pumpkin, *Telfairia occidentalis*, is one of the most important vegetables grown among the people of south-eastern Nigeria in which Imo is among and forms an important condiment in the national diet (Ibekwe and Adesope, 2010). Amongst the different foods, production and consumption of fluted pumpkin is very important because of its contribution to good health by providing minerals and vitamins needed to supplement people's diet which are mainly carbohydrates (Abu and Asembler, 2011). It is an important leaf vegetable belonging to the *cucurbitacea* family, grown in West Africa for its edible seeds (fluted guard) (Enabulele and Uavbarhe, 2001). It is known by several names: 'Ugu' (Igbo), 'Iroko' or 'Aporoko' (Yoruba), 'Ubong' (Efik), 'Umee' (Urhobo), 'Umeke' (Edo) (Opajobi, Esume, Osasuyi, and Okehie, 2011). Francisca and Eyzaguirre (2006) asserted that increase in vegetable production could improve food security and offer employment opportunities to many unemployed people in Nigeria. Ironically, farming households are the most affected in terms of food security in Nigeria especially small holder farmers who produce the bulk of food consumed in the country. The biggest challenges of food security today came from measures adopted to control the spread of the COVID-19 disease; all necessary adjustments within the sector to comply with those measures which has increased cost and change consumption patterns in response to COVID-19. To what extent did these measures especially

lockdown affect the food security of fluted pumpkin farmers in Imo State. This study was therefore undertaken to bridge the gap in knowledge on the perceived effect of COVID-19 lockdown on the food security status of fluted pumpkin farmers in Imo State.

The study specifically, (i)ascertained the perceived food security status of vegetable farmers in Imo State;(ii)determined the output of fluted pumpkin before and amidst the COVID-19 lockdown;(iii) ascertained the perceived effects of COVID-19 lockdown on vegetable production in Imo State and (iv)identified the measures farmers are adopting to curtail the effects of COVID-19 on their food security in the study area;

Hypothesis of the Study

H₀: There is no significant difference between the output of fluted pumpkin farmers before COVID-19 lockdown and currently.

Research Methodology

The study was conducted in Imo State. The population of the study comprised of fluted pumpkin farmers. Multistage sampling procedure was adopted for the study. First stage adopted purposive selection of five Local Government Areas(L.G.A.s) from the 27 LGAs in Imo State. This was done because of the predominance of fluted pumpkin (*Telfairia occidental*) production in the respective areas. In the

second stage, two (2) communities were randomly selected from each of the five (5) local government areas selected, making a total of ten (10) communities.

The third stage also adopted random selection of ten (10) vegetable farmers from each of the ten communities selected giving a total sample size of one hundred (100) vegetable farmers for the study.

Descriptive statistics such as frequency count, mean and percentage were used to realize objectives. Objective i was realized using the core food security module. The core module questions on food security were elicited through a 3-point likert scale of Never True (NT) equal 1, Sometimes True (ST) equal 2, and 3 for Often True (OT). A discriminating index of 2.0 was used to develop the decision rule to determine if the farmers were food insecure with hunger (0.1 – 1.0), food insecure without hunger (1.1 – 2.0) and food secure (2.1 – 3.0). Objective ii was realized using mean score through a 4-point likert scale of strongly disagree 1, disagree 2, agree 3, and strongly agree 4. A discriminating index of 2.5 was used to determine the decision rule which states that any variable that is ≥ 2.5 is regarded as perceived effect and any variable that is < 2.5 is regarded as not perceived as effect.

The null hypothesis was tested using paired sample t-test.

The formula is given as;

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where t is calculated

X_1 and X_2 are the means of the quantity of output of fluted pumpkin before and amidst the lockdown respectively;

S_1^2 and S_2^2 are standard deviation of the quantity of output of fluted pumpkin before and amidst the lockdown respectively;

n_1 and n_2 are the sample size of fluted pumpkin farmers before and amidst the lockdown respectively

If the calculated t – value is greater than critical t – value, then we reject the null hypothesis.

RESULT AND DISCUSSIONS

Perceived food Security Status of vegetable farmers using the Core Food Security Module farmers in the last 12 months

Table 1 contains information on the multiple questions reflecting varying degrees of food security status of vegetable farmers in the last 12 months, through

individuals' perceptions of their food situation in the past 12 months. Following the methodology adopted by Abubakar (2013) and Asomugha *et al.*, (2017), the core food security module was adopted to measure the degree of food security of each individual question, aggregate them and then arrive at the overall mean social food security level. Our interest in the Core Food Security Modules is to classify the vegetable farmers either as food secure, food insecure without hunger, or food insecure with hunger. Therefore, using a discriminating index of 2.0, a decision rule was stated to determine where the vegetable farmers belonged; 0.1 – 1.0 for food insecure with hunger; 1.1 – 2.0 for food insecure without hunger; or 2.1 – 3.0 for food secure. Based on farmers' responses to these questions, food security indicators provide us insight to comment on the overall mean food insecurity. Since the results from the table reveals a grand mean of 1.57, then we can ascertain that the vegetable farmers were food insecure without hunger. i.e., According to Bickel *et al.*, (2000), farming household that are food secure are household that show no or minimal evidence of food insecurity. Farming households that are food insecure without hunger experience food insecurity in terms of the farmers' concerns about adequacy of their food supply, concerns about adjustments in their food management, including reduced quality of food and increased unusual coping patterns with little or no reduction in their food intake reported. Here, the children are typically the last to feel the effects of food insecurity because the parents sacrifice their own meals for them. While household that is food insecure with

hunger, at this level the households reduce the children’s food intake to an extent indicating that the children have experienced hunger. Adult in households with and without children have repeatedly experienced more extensive reduction in food intake. This is in agreement with the studies of Niles, Bertmann, Belarmino, Wentworth, Biehl and Neff (2020). Wolfson and Leung (2020) provide empirical support of the increased level of food insecurity experienced during the pandemic.

Table1: Perceived food Security Status of vegetable farmers using the Core Food Security Module

S/N	Food Security Variables	OT (3)	ST (2)	NT (1)	MS
1	Adult Cut/Skip Meal	20	33	47	1.73
2	Adult did not eat for a whole day	–	–	100	1
3	Children skipped meal	8	21	71	1.37
4	Worried food would run out	36	57	7	2.29
5	Food bought did not last	18	54	28	1.9
6	Adult did not eat balanced meals	21	51	28	1.93
7	Children were fed few, low-cost foods	15	38	47	1.68
8	Children were not fed balanced meals	8	43	49	1.59
9	Children were not eating enough	6	42	52	1.54
10	Adults ate less than should have	28	56	16	2.12
11	Adults were hungry but didn’t eat	10	33	57	1.53
12	Adults lost weight	5	20	75	1.3
13	Children had their meal size cut	7	27	66	1.41
14	Children were often hungry	5	12	83	1.22
15	Children did not eat for whole day	–	–	100	1
Grand Mean					1.57

Source: Field Survey Data, 2021. OT – Often True; ST – Sometimes True; NT – Never True; MS – Mean Score; Cut-off point – 2.0; Food insecure with hunger = 0.1 – 1.0, Food Insecure without hunger 1.1 – 2.0; or 2.1 – 3.0 for food secure

Output of Vegetable farmers (fluted pumpkin) before and amidst the covid-19 lockdown

The result of the farmers' distribution based on quantity of output of fluted pumpkin before and amidst the lockdown is compiled in table 2 below. It shows that majority (86%) of the farmers harvested between 1 – 3 bundles before the lockdown and the remaining 14% had an output of 4 – 6 bundles. The mean output was 2.4 bundles. The results also revealed that amidst the lockdown, a greater percentage (97%) of farmers harvested between 1 – 3 bundles whilst only 3% were able to maintain an output of 4 – 6 bundles amidst the lockdown. The mean output was 1.98 bundles. Ojogho (2010) noted that lower output of the farmers' increases food insecurity status of arable farmers and the higher the output of the farmers, the greater the likelihood of food security. The implication is that due to the limited farm size of the farmers, they were not able to utilize their farmlands effectively and also, irrespective of the fact that most of the farmers had already began production before the lockdown started, it would seem that they neglected their farms and were only able to produce an average of 2 bundles because there was restriction of movements and those that had access to their farmlands were more interested in their health.

Table 2: Distribution according to Output of vegetable (fluted Pumpkin) farmers produced before and Amidst the COVID-19 Lockdown

Quantity (Bundles(10 kg)	Before			Amidst		
	Frequen cy	Percenta ge (%)	Mea n	Frequen cy	Percenta ge (%)	Mea n
1 – 3	86	86.0	2.43	97	97.0	1.98
4 – 6	14	14.0		03	3.0	
Total	100	100.0		100	100.0	

Source: Field Survey Data, 2021

PERCEIVED EFFECTS OF COVID-19 LOCKDOWN ON VEGETABLE PRODUCTION

The result of the distribution based on the perceived effect of COVID-19 lockdown on vegetable production is presented in table 2. Using a discriminating index of 2.5, any variable with a mean score that is ≥ 2.5 for perceived effect and < 2.5 for not perceived as effect for a 4-point likert-type scale of (1) strongly disagree, (2) disagree, (3) agree, and (4) strongly disagree. Post-harvest losses ($\bar{x}=2.66$), reduced farm income ($\bar{x}=2.85$) increased cost of inputs ($\bar{x}=3.28$) inaccessibility to market ($\bar{x}=2.85$) and customers ($\bar{x}=2.59$) were the perceived effects of COVID-19 lockdown had on vegetable production while Inaccessibility to farmlands ($\bar{x}=2.47$) and reduced demand for vegetables ($\bar{x}=2.47$) were not perceived as effects their

mean score was less than the cut-off point. Kamal, Chemissedine and Hamid (2020) summarized the various effects of COVID-19 pandemic impacted on agricultural commodities sales, as the lockdown measures involved major buyers of vegetables such as restaurants, hotels, schools, and major shopping centers. Secondly, perishable agricultural products (such as vegetables and fruits) have also been damaged, due to movement restriction, which inflicted significant losses to the farmers. Thirdly, the Covid19 pandemic has affected incomes, as a result of suspending some agricultural activities, due to the quarantine measures and the imposed restrictions, and thus the purchasing power of small-holder farmers reduced.

Table 3: Distribution According to the Perceived Effects of the Lockdown on Fluted Pumpkin Production among Farmers

Effects	SA	A	D	SD	MS	SD	Remark
Inaccessibility to farmland	8	38	47	7	2.47	0.75	NPE
Post-harvest losses	12	43	44	1	2.66	0.69	PE
Reduced farm income	11	63	26	-	2.85	0.59	PE
Increased cost of inputs	36	59	2	3	3.28	0.65	PE
Inaccessibility to market	5	70	23	2	2.78	0.56	PE
Inaccessibility to inputs	9	83	6	2	2.99	0.48	PE
Inaccessibility to customers	3	53	44	-	2.59	0.55	PE
Inaccessibility to ext. service	11	67	22	-	2.89	0.56	PE
Reduced demand for vegetables	5	37	58	-	2.47	0.59	NPE
Grand Mean					2.77		

Source: Field Survey Data, 2021. MS – mean score; SD – standard deviation; Discriminating index (Cut-off point) – $2.5 \geq 2.5$ perceived effect (PE), < 2.5 Not perceived as effect (NPE)

MEASURES VEGETABLE FARMERS ADOPTED TO CURTAIL THE EFFECT OF COVID-19 ON THEIR FOOD SECURITY

The result of the measures vegetable farmers adopted to curtail the effects of COVID-19 on their food security is presented in table 3 below. It was revealed that 91% of the farmers adopted establishing a customer base in their locality as an adapting mechanism. It was followed by diversification into other fields (79%) and adoption of improved farming practices (67%) as a coping strategy to the changing conditions, farming households adopted certain innovative measures in their agricultural activities. Reports from other authors revealed that consumers are changing where they eat, and where they buy their food (Kolodinsky, Sitaker, Chase, Smith and Wang, 2020), and therefore farmers have to adapt to these changes and find different ways of getting their produce to consumers.

The pandemic, which is jeopardizing the food security of farmers, including small- and large-scale farms, has led, businesses, farmers, and consumers to change their model and behavior, in the light of closed restaurants and schools (Kolodinsky *et al.*, 2020). This shows that farmers are more willing to adopt innovative measures to regain their food security. This result is in agreement with Ecker, (2018) who stated that production diversification could lead to increases in farm income. Ecker

and Patrick (2019) suggest that farm production diversification was the dominant strategy for Nigerian farm households to overcoming food security. Although skill acquisition and the procurement of loans ranked least in measures adopted, it shows that the farmers were not much interested in these area or they were not open to these choices.

Table 3: Distribution according to Measures farmers Adopted to curtail the Effects of COVID-19 on their Food Security

Measures	Frequency	Percentage (%)	Rank
Digital Marketing	40	40.0	6 th
Diversification into other fields	79	79.0	2 nd
Skill acquisition	34	34.0	7 th
Established customer base in locality	91	91.0	1 st
Acquisition of loans	07	07.0	8 th
Planting improved variety to increase yield	47	47.0	5 th
Adoption of improved farming practices	67	67.0	3 rd
Involvement in cooperatives	51	51.0	4 th

*Multiple Responses; **Source:** *Field Survey Data, 2021*

Paired Sample t-test

The result of the paired sample t-test presented in table 4 below shows that “ $t = 0.56791$, $p < 0.05$, two-tailed”. This means that the mean scores before and amidst the COVID-19 lockdown were significantly different. Basically, the interest here is in determining the difference in the output of fluted pumpkin before and amidst the lockdown. The mean scores of the output of fluted pumpkin before and amidst the lockdown were compared using a paired sample t-test. There was significant difference ($t = 0.56791$, $df = 6.826$, $p \leq 0.05$, two-tailed test). Means of the scores of the output of fluted pumpkin before lockdown ($M = 2.43$, $SD = 1.02$) and amidst lockdown ($M = 1.98$, $SD = 0.91$). The difference in the mean (Mean difference = 0.44).

Looking at the two means, one can confidently say that the mean before the lockdown was higher than the mean amidst the lockdown. Therefore, we reject the null hypothesis which states that ‘There is no significant difference between the output of fluted pumpkin farmers before COVID-19 lockdown and amidst’.

Table 4: Paired Sample Statistics

	Mean	N	Std. Deviation	Std. Error Mean	t	Sig. (2-tailed)
Pair 1	2.4250	100	1.02093	.10209	.56791	.000
Bundle Before						
Bundle Amidst	1.9850	100	.90580	.09058		

Conclusion and Recommendations

The study concluded that COVID-19 lockdown adversely affected the food security status of vegetable farmers and the production (Fluted Pumpkin) in Imo State as perceived by vegetable farmers. The following recommendations were made based on the findings of the study:

1. The government both State and federal and other non-governmental agencies should provide more support to small-scale farmers in adapting to the pandemic so as to aid in the increase of farmers' food security.
2. Lockdown and control measures should not limit the transportation of agricultural products. Priority must be given to vegetables as they have low storage capacity.
3. Vegetable farmers should get involved in diversification and digital marketing to make use of innovative methods of promoting sales.
4. Investment on innovations that can promote adequate storage during the peak of harvesting should be encouraged among farmers to avoid wastage.

REFERENCES

- Abu, O. and Asembler, D.J. (2011). Opportunities for smallholder spinach farmers in Nigeria: a profit efficiency analysis. *Journal of Economics*, 2(2): 75-79
- Abubakar, M. S.(2013). “An EmpericalAnalysis of Household Food Security in Gombe State, Nigeria)” Ahmadu Bello UniversityM.Sc. /Soc-Sci /9301 / March, 2009-2010.
- Akande-Sholabi, W. and Adebisi, Y. A.(2020). The impact of COVID-19 pandemic on medicine security in Africa: Nigeria as a case study.
- Akpan, S. B.,Aya, E. A, Essien, U. A.,Akpan, O. D.and Bassey, N. E.,(2011). Analysis of total factor productivity among smallholder vegetable farmers in Akwa-Ibom State, Nigeria.*Nigerian Journal of Agric, Food &Environment.*, 7(4): 68-74.
- Akpan, S.B., Udoh, E.J. and Aya, E.A., (2010). Fertilizer-manure substitution among arable crop farmers in akwaibom state: empirical evidence. *Global Journal of Agricultural sciences*, 9(1): 37-40.
- Asomugha,Ijeoma, C.I. and Uwaegbute, A.C. and Obeagu, E. I. 4(10): 2017 *International Journal of Advanced Research in BiologicalSciences* ISSN: 2348-8069. 4(10): 62-77 : <http://dx.doi.org/10.22192/ijarbs.2017.04.10.010>
- Badmus, M. A. and Yekini, O. T. (2011).Economic analysis of exotic vegetable production among urban fadama women farmers in Akinyele local Government Area of Oyo State, Nigeria. *International Journal of Agricultural Economics and Rural Development*, 4 (1): 19-24.
- Barichello, R., (2020).The COVID-19 pandemic: Anticipating its effects on Canada's agricultural trade.*Canadian Journal of Agricultural Economics*, 68.
- Bedru, B. B.,Oyeyemi, A. I.,Ogunniyi, A. F., Hyacinth, E.J.,AikiKwaw, S. A. andIFPRI(2020). The Effects of COVID-19 Policies on Livelihoods and

Food Security of Smallholder Farm Households in Nigeria Descriptive Results from a Phone Survey. International Food Policy Research Institute

- Ben-Chendo, G.N., Ibeagwa, O.B., Ukoha I.I., Essien, U.A., Onyemauwa, S.C., Uhuegbulem, I.F. and Okwara M.O. (2017). Productivity Analysis of *Telfairia* Based Cropping Systems of Women Farmers in AhiazuMbaise Local Government Area of Imo State, Nigeria. *FUTO Journal Series (FUTOJNLS)* Department of Agricultural Economics, Federal University of Technology, Owerri, Nigeria 3(1): 56 - 63 www.futojnls.org
- Benson, T. (2008) Improving Nutrition as a Development Priority. Addressing under-nutrition in national policy processes in sub-Saharan Africa. IFPRI Report 156.
- Bickel, Gary, Mark Nord, Cristofor Price, William Hamilton, and John Cook: Guide to Measuring Household Food Security, Revised 2000. U.S. Department of Agriculture, Food and Nutrition Service, Alexandria VA. March, 2000. Or in short form as USDA, Guide 2000. http://www.africare.org/at_work/offd/index.html. Washington DC: Africare/Headquarters.
- Deaton, B.J., (2020). Food security and Canada's agricultural system challenged by COVID-19. *Canadian Journal of Agricultural Economics*, 68.
- Ecker, O, Breisinger, C.(2012). The food security system: A new conceptual framework. IFPRI Discussion Paper 1166. Washington, D.C.: International Food Policy Research Institute (IFPRI) : <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/126837>.
- Ecker, O. and Patrick H.(2019). Agricultural transformation and food and nutrition security of farm households in Nigeria Invited paper presented at the 6th African Conference of Agricultural Economists, September 23-26, 2019, Abuja, Nigeria

-
- Ecker, O. (2018). “Agricultural Transformation and Food and Nutrition Security in Ghana: Does Farm Production Diversity (Still) Matter for Household Dietary Diversity?” *Food Policy* 79: 271-282.
- Enabulele, H.N and Uavbarhe K.O (2001) “A trend in the Analysis of the Production of some Horticultural Crops in Nigeria”.*Nigerian Journal of Horticultural Sciences (NJHS)*, 5 (1): 1-9.
- FAO, IFAD, UNICEF, WFP, & WHO. (2020). The State of Food Security and Nutrition in the World: Transforming Food Systems for Affordable Healthy Diets. In *The State of the World*.<https://doi.org/10.4060/ca9699en>
- FAO, (2002).The State of food insecurity in the world.FAO Report. Rome. 2002.Food and Agriculture Organization.
- FAO, (2020). Q& A: COVID-19 pandemic – impact on food and agriculture | FAO | Food and Agriculture Organization of the United Nations. <http://www.fao.org/2019-ncov/q-and-a/impact-on-food-and-agriculture/en/>
- FAO (Food and Agriculture Organization FAO) and CELAC (Community of Latin American and Caribbean States) 2020.Food security under the COVID-19 pandemic. Rome. <https://doi.org/10.4060/ca8873en>
- Francisca, S. I. and Eyzayuirre, P. (2006). African leafy vegetables: Their Role in the World Health Organization’s Global Fruit and Vegetable Initiative-peer-reviewed annual publication designed to comprehensively measure and track hunger at the global, regional, and country levels. *GlobalHunger Index*.<https://www.globalhungerindex.org/results.html>
- Gurung, B., Thapa, R., Gautam, D., Karki, K., and Regmi, P. (2016). Commercial vegetable farming: An approach for poverty reduction in Nepal. *Agronomy Journal of Nepal*, 4: 92-106.
- Ibekwe, U.C. and Adesope, O.M. (2010). Analysis of dry season vegetable production in OwerriWest Local Government Area of Imo State, Nigeria.*Journal of Development and Agricultural Economics*, 2(6): 245249.

-
- Kamel Muloudj; Ahmed ChemseddineBouarar; Hamid Fechit. Received: 11/06/2020/Accepted: 02/07/2020/ Published: 18/07/2020. The Impact of Covid-19 Pandemic On Food Security
- Kerr, W.A., (2020). The COVID-19 pandemic and agriculture – Short and long run implications for international trade relations. *Canadian Journal of Agricultural Economics*, 68.
- Kolodinsky, J., Sitaker M., Chase L., Smith D., & Wang W., (2020). «Food systems disruptions: Turning a threat into an opportunity for local food systems».In *Journal of Agriculture, Food Systems, and Community Development*, 9, n° 3, pp 5–8.
- Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., et al. (2020).Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia.*New England Journal of Medicine*,382(13), 1199-1207
- Mlozi MRS 2003. Urban agriculture: vegetable production in metropolitan greater Vancouverdistrict in Lannansokoine University of Agriculture Morogore, Tanzania.
- Nigeria Centre for Disease Control. COVID-19 Outbreak in Nigeria Situation Report S/N 54.
Abuja; 2020.[Internet]. 2020 [cited 2020 Apr 23]. Available from: <https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID19%20outbreak%20in%20Nigeria>
- Nigeria Centre for Disease Control. First Case of Corona Virus Disease Confirmed in Nigeria
Accessed April 1, 2021. Available from: <https://ncdc.gov.ng/news/227/first-caseof-corona-virus-disease-confirmed-in-nigeria>
- Niles, M. T., Bertmann, F., Belarmino, E. H., Wentworth, T., Biehl, E., & Neff, R. (2020). The early food insecurity impacts of COVID-19. *Nutrients*, 12(7), 1–23. <https://doi.org/10.3390/nu12072096>
- Ojo, E. O. and Adebayo, P. F. (2012). Food Security in Nigeria: An overview *European Journal of Sustainable Development* (2012), 1, 2, 199-222 ISSN: 2239-5938

Olapegba, P. O., Ayandele, O., Kolawole, S. O., Oguntayo, R., Gandi, J. C., Dangiwa, A. L. (2020). A preliminary assessment of novel coronavirus (COVID-19) knowledge and perception in Nigeria. *MedRxiv*, 04(11), 20061408.

Opajobi, A.O., Esume, C.O., Osasuyi, A. And Okehie, C.C. (2011). Determination of the lead content of Pumpkin leaf *Telfairia Occidentalis* in selected towns of Delta State, Nigeria. *Journal of current world Environment*. 6(1): 39-44.

Wolfson, J. A., & Leung, C. W. (2020). Food insecurity and COVID-19: Disparities in early effects for us adults. *Nutrients*, 12(6), 1–13. <https://doi.org/10.3390/nu12061648>