



Impact of COVID-19 pandemic on food price index in Nigeria

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The economic effect of the COVID-19 pandemic and lockdown on food access/demand can lead to food price changes. This study was designed to evaluate the covid-19 influenced differences in food commodity prices. The study design captured eight urban markets in eight Nigerian states. A multi-stage sampling technique was employed. The number of sample points for each measure and commodity ranged from two to four per selected market. Local measures of commodities sold by traders were obtained and weighed using a calibrated weighing scale. The price equivalent of the weighted portions was obtained for three designated intervals; the pre -COVID-19 lockdown (September 2019), the peak of nationwide lockdown (May-June 2020), and post COVID-19 lockdown (March 2021). Results revealed that cereals/grains prices significantly increased (4.87-23.53%) during the lockdown and even further (38.68-65.16%) after the lockdown. Yam, sweet potato, and cassava flour (alagbo) experienced a double increase in the post-lockdown (96.32-117.5%) price. The market price for legumes/nuts increased during the lockdown (4.51-47.37%) and worsened post-lockdown (27.82-155.26%). Vegetables recorded a massive leap in price within the lockdown period (64.39-197.98%) than post-lockdown (-8.95% to 66.22%). Same was observed for goat meat (lockdown price – 30.0%; post-lockdown -12.38%). Egg and milk recorded a mild upsurge in the price during the lockdown (12.69-16.46%) and post-lockdown era (18.28-29.86%). Other essential commodities such as oil, salt, and sugar experienced a price upsurge as well (lockdown; 3.82 -17.07; post lockdown; 0.31-21.9%). Food prices increased during the lockdown and worsened afterward, efforts to eliminate food system disruptions will boost food production and enhance physical accessibility.

1. Introduction

The coronavirus pandemic has sparked not only a health crisis but also an economic crisis, which poses a severe threat to food security in low and middle-income countries (Swinnen & McDermott, 2020).

Due to the high rate of COVID-19 spread and the absence of a vaccine for its treatment/prevention in 2020, Nigeria adopted “lockdown” to reverse epidemic growth and reduce case numbers to low levels (NCDC, 2020). The lockdown strategy in Nigeria was characterized by restriction of social gatherings, closure of educational institutions, halting of all non-essential economic activities, and a ban on domestic and international travel (Seal of the President of the Federal Republic of Nigeria, 2020; Ewodage, 2020). Although most African governments consider food supply chains to be “essential” and have exempted them from lockdown policies, food systems are not immune to the effects of the pandemic. This is reflected in an estimated 18% drop in agri-food Gross Domestic Product during the five-week lockdown exercise in Nigeria (Thurlow, 2020).

Evidence has shown that COVID-19 induced lockdown affected food systems directly through impacts on food supply and demand (Paul and Chowdhury, 2020; FAO, 2020a), and indirectly through a decrease in purchasing power (Thurlow, 2020; Afridi *et al.*, 2021; Teachout and Zipfel, 2020; IHEME *et al.*, 2020), the capacity to produce and distribute food (IFPRI, 2020; FAO, 2020b; Stephens *et al.*, 2020) and the intensification of care tasks (Coke-Hamilton and Nkurunziza, 2020; WHO, 2020). These severe effects are expected to affect access to food and food demand which will consequently lead to downward pressure on agricultural prices (Torero, 2020; Espita *et al.*, 2020).

In Nigeria, attention has been focused on COVID-19 impact on health, livelihood, and food security in previous studies (Thurlow, 2020; Matthiew and Celine, 2020; FAO, 2020b; Ajibo, 2020; Babatunde *et al.*, 2020), with a dearth of evidence on COVID-19 influence on food price indexes in Nigeria (Beckman *et al.*, 2021; GAIN, 2020). This paper will explore the price differences in food commodities before COVID-19, the peak of lockdown, and post lockdown.

2. Materials and Methods

Study Design

A descriptive and cross-sectional study was employed to determine the COVID-19 influenced food price indexes in Nigeria.

Study Location/Profile of selected markets

The study was conducted across the Urban Markets in various zones in Nigeria. Markets play a vital role in the economic life of the people, and they are essential in the chain of commodity distribution (Adeyinka *et al.*, 2016). Trading is one of the most popular activities in the informal sector of the economies of Nigerian cities. There is a high volume of trade and other economic activities in urban Nigerian markets as people from different origins and regions come to buy, sell items or transact business. Markets in large metropolitan areas organize their marketing system for both domestically consumed and exported commodities as well as the distributing system for imported foodstuff (Adeyinka *et al.*, 2016).

The eight selected urban markets comprise; Ogbete Market Enugu State, Ubani Market Abia State, Margaret Umahi International Market, Ebonyi State, Bodija Market Oyo State, Kuto Market Ogun State, Katsina Central Market Katsina State, Gombe Central Market Gombe State, Jos Main Market Plateau State. The geographical distribution of the surveyed markets is shown in Figure 1.

Ogbete market is a daily market in Enugu North LGA. Male and female traders sell food and non-food commodities. It is also patronised by traders from neighbouring cities - Onitsha, Aguleri, Abakaliki and Aba. Ubani market is the central market in Umuahia following its relocation from Isi-gate Umuahia. Traders from within and outside Umuahia city patronize the market for food and other commodities. It is located within latitude (DMA) 5o 31 60N and Longitude (DMS) 7o 28“60E. It is bounded by Bende Local Government Area on the West, Isuikwuato Local Government Area on the South, Umuahia South on the North and Ikwuano Local Government on the East (Okezie *et al.*, 2017).

Following the dissolution of the Abakpa Main Market which was formally ranked amongst the oldest markets in the South-East and beyond, a new ultramodern market - Margaret Umahi International Market located along Abakaliki Ogoja Road on the West African Trans-Saharan highway was constructed. This new market is patronized by traders and consumers for food and non-food commodities.



Bodija Market is a famous open-air market located in Bodija, Ibadan North, Oyo State, South-West Nigeria (Grace *et al.*, 2019). Bodija market is the central food-stuff depot of Ibadan city as it carries the employment burden of a large percentage of the over 5 million inhabitants of Ibadan (Abumere, 2002). The location of the market is close to the Oyo-Ogbomoso-Ilorin interstate road network (Wikipedia, 2020). This facilitates the movement of farmers and traders from Northern Nigeria and Northern Oyo State to transport their produce to the market. The market is a mixture of open space trading and concrete and wooden stalls. Many wholesalers gravitate towards ownership of the concrete stalls while retailers own most of the open space kiosks and trading locations (Wikipedia, 2020).

Kuto market is an urban daily market located in Abeokuta South Local Government Area of Ogun State. However, there is a unique market every five days when farmers from nearby villages bring their wares for direct sale to traders and consumers. The market which is set-out along the link road to Lagos State, the former capital city of Nigeria is bounded by the Federal Secretariat and a Government Reserved Area (Idris, 2005). It is widely patronized by the wealthy and the poor who purchase a various array of (agricultural and industrial) commodities from the market including traders from Lagos, Shagamu, Eghado and Ibadan who patronize the market regularly (Idris, 2005).

Katsina Central Market; the name implies, this market is centrally located in Katsina South LGA. It is a daily market with both men and women trading food and other non-food commodities. The market has permanent structures with lockable stores (Nan, 2021).

Gombe Central Market is a daily market located in Gombe State. It is one of the major urban markets and is patronized by consumers and traders from neighbouring cities and communities.

Jos Main Market, also known as Jos Terminal Market, was an ultra-modern market located in Jos, Plateau State Nigeria (Aijah, 2014; KapaNews, 2020). It was known to be the largest indoor market in West Africa (KapaNews, 2020). Currently, about 70% of buying and selling take place in the terminus within the vicinity of the main market. The terminal market now consists of an estimated population of 850 Shop

owners with 1,110 vendors recorded (Orewere *et al.*, 2019).

Sampling

A multi-stage sampling technique was employed. The urban markets in the studied zones/regions were purposively selected. A stratified sampling technique was used to categorize the selected markets into strata – each stratum representing a particular commodity/staple food. Also, the number of sample points for each measure and commodity ranged from two to four per selected markets.

Samples of commodities sold by selected traders were measured using the local measure obtained from the trader and poured into a polythene bag. This was then weighed using a scale calibrated in the metric system. Weight was recorded in kg and price equivalent (in naira) obtained from each sample point and the average calculated for each commodity.

Data Collection

Eight (8) investigators and twenty-four (24) research assistants trained on the use of the survey instruments were involved in the data collection. A pilot study was conducted in two urban markets that were not captured in the sampling frame, this was done to refine the content and approach of the survey instruments. Preliminary visits were made to the L.G.A chairmen, community councilors, and market leaders to seek permission to conduct this survey.

Informed Consent

This study was conducted in accordance with the guidelines laid down in the declaration of Helsinki. Written informed consent was obtained, the objectives of the study, assurance of no harm, the confidential use of information supplied, and freedom to participate or withdraw from the study at any point were clearly explained to them.

Data Analysis

Descriptive statistics (frequency, percentage, mean and standard deviation) were computed for the continuous variables. Paired t-test was used to compare the impact of the COVID-19 lockdown on the price indexes of the staples during (May-June, 2020) and af-

ter the lockdown (March 2021). Pre COVID-19 food prices (September 2019) served as the baseline price for comparison. Significance was judged at $P < 0.05$.

3. Results

Results revealed that the cost of cereals/grains significantly increased by less than a quarter (4.87-23.53%) during the lockdown, and the price difference increased even further (38.68-65.16%) after the lockdown.

In comparison to the baseline price (pre-COVID price), it was observed that the cost of yam doubled during (92.59%) and after (100.00%) the lockdown. The cost of alabo (cassava flour) and sweet potato increased remarkably after the lockdown (96.32-117.5%) than during it (16.56-47.50%). Other root and tubers crops, their market price increased in the lockdown season (6.26-47.5% and more beyond it (12.51-56.52%).

The market price for legumes and nuts slightly increased during the lockdown (4.51-47.37%), this price situation even worsened after the lockdown (27.82-155.26%). Melon reportedly had a mild (18.35%) decline in purchasing price during the national COVID-19 pandemic lockdown and a further elevation in price after the lockdown (6.96%).

Foods within the vegetable category (pumpkin, okro, tomato, onion, pepper, and carrot) had a huge leap in price within the lockdown period (64.39-197.98%) than post-lockdown era (-8.95% to 66.22%).

There was a significant ($p < 0.05$) moderate rise in the cost of fish and meat products during (17.39-30.0%) and after the lockdown (12.38-30.57%). Unlike others, the market price of goat meat which increased to 30.00% during the lockdown, considerably dropped to 12.38%.

Other animal protein alternatives like egg and milk



Figure 1. Geographical distribution of the surveyed urban Nigerian markets

also recorded a mild upsurge in the price during the lockdown (12.69-16.46%) and post-lockdown era (18.28-29.86%). Similarly, the price of groundnut oil and salt increased during the lockdown (8.03% and 7.64%) and even after the lockdown (21.90% and

17.81%), respectively. Palm oil and sugar commodities experienced a dip in the elevated market price of 17.07 and 3.82% (lockdown) to 3.17% and 0.31% (post lockdown).

Table 1: Price differences in food commodities

Food commodities	M e a n weight (kg)	Baseline/ pre- COVID - 19 price (₹)	COVID - 19 lockdown price (₹)	% difference	P o s t lockdown price (₹)	% difference
Cereals/grains						
Rice	1.89	825.00	1019.12	23.53**	1144.12	38.68*
Wheat	1.90	449.64	518.57	15.22*	671.43	49.33*
Millet	1.73	401.82	496.36	23.53*	663.64	65.16*
Spagetti	0.50	194.62	215.39	10.67**	252.31	57.69*
Maize	1.86	326.43	387.86	18.82*	494.64	51.53**
Sorghum	1.52	317.27	332.73	4.87	382.73	20.63**
Bread	0.44	242.00	266.00	9.92**	277.00	14.46**
Starchy roots and tubers						
Garri	1.35	373.33	504.67	35.18*	524.00	40.36**
Alabo	0.91	163.00	190.00	16.56	320.00	96.32**
Fufu	0.30	44.44	47.22	6.26	50.00	12.51*
Yam	1.90	225.00	433.33	92.59**	450.00	100.00**
Plantain	1.02	418.18	600.00	43.48**	654.55	56.52*
Sweet potato	1.37	333.33	491.67	47.50**	725.00	117.50**
Irish potato	1.42	453.85	553.85	22.03**	661.54	45.76**
Legumes and nuts						
Beans	1.28	588.95	666.84	13.22**	908.42	54.24*
Soybeans	1.51	386.36	422.73	9.41*	563.64	45.88**
Bambara nut	1.90	542.86	800.00	47.37	1385.71	155.26*
Groundnut	1.33	604.55	631.82	4.51	772.73	27.82**
Melon	0.46	455.44	371.88	-18.35**	423.75	6.96**
Vegetables						
Pumpkin	0.20	94.29	155.00	64.39**	140.00	48.48**
Okro	0.16	120.00	203.85	69.88*	180.77	50.64**
Tomato	0.94	204.55	368.18	80.00*	340.00	66.22**
Onion	1.22	319.29	951.43	197.98**	290.71	-8.95
Pepper	0.17	99.29	181.43	82.73**	130.71	31.64**
Carrot	0.37	75.00	128.57	71.43*	122.86	63.81***
Fruits						
Orange	0.46	67.86	103.57	52.62*	92.86	36.84**
Banana	0.67	263.64	350.00	32.76*	368.18	39.65**
Watermelon	0.89	304.55	340.91	11.94	358.18	17.61*
Pawpaw	0.92	165.00	233.00	41.21**	260.00	57.58**
Pineapple	0.69	240.00	285.00	18.75*	305.00	27.08**

Continue table 1. Price differences in food commodities

Food commodities	M e a n weight (kg)	Baseline/ pre- COVID - 19 price (₦)	COVID - 19 lockdown price (₦)	% difference	P o s t lockdown price (₦)	% difference
Animal protein						
Fish	0.70	747.06	920.59	23.23**	929.41	24.41**
Beef	1.00	1427.27	1800.00	26.11*	1863.64	30.57**
Goat	0.92	1500	1950	30.00**	1685.71	12.38*
Snail	0.48	575.00	675.00	17.39**	566.67	-1.45
Egg	3.00	1014.71	1181.77	16.46	1317.65	29.86**
Milk	0.25	783.13	882.50	12.69	926.25	18.28
Oil						
Groundnut oil	0.78	913.33	986.67	8.03**	1113.33	21.90**
Palm oil	0.92	946.15	1107.69	17.07**	1150.00	3.82*
Other essential foods						
Salt	0.40	69.41	74.71	7.64	81.77	17.81**
Sugar	0.95	395.00	407.50	3.17	396.25	0.31

** P-value is judged significant at 0.01

* P-value is judged significant at 0.05

4. Discussion

Study reported a significant increase in almost all the food commodities during the COVID-19 pandemic when compared to the pre-COVID-19 period. Similarly, the impact of the COVID-19 pandemic and lockdown on food price inflation has been reported/estimated in other regions (Paul and Chowdhury, 2020; Espita *et al.*, 2020; Beckman *et al.* 2021; He *et al.*, 2020; Paskalis *et al.*, 2021; Akter, 2020).

The degree of COVID-19 influenced price inflation in this study ranged from as low as 3.17% increase in sugar price to as high as 197.98% in the market price of onion during the lockdown and 0.31-155.26% rise after the lockdown. This agrees with reports that the global average prices for a variety of food products increased by 2 to 9 percent, with half of the tracked goods rising by 7 percent or more (IFPRI, 2020). In some developing countries, an 80-133% rise in the price of several food products was reported (IFPRI, 2020).

It was observed that the degree of price inflation of vegetables and fish/meat products during the 'stay

at home' restriction was higher than those observed in the post-lockdown period. This is consistent with findings from Akter, (2020) where COVID-19 lockdown resulted in an estimated point increase in meat, fish, seafood, and vegetables. An empirical examination of recently compiled FAO data confirmed a distinct increase in prices paid by the end-consumer during the country specific-lockdown period (FAO 2021a; FAO, 2021b).

With exception to foods within the vegetable and meat/fish categories, the difference in the pre-COVID 19 and post lockdown price of food commodities exceeds the pre-COVID 19 and lockdown price differentials. This is an indication that the longstanding impact of the COVID-19 pandemic on food commodity prices and the economy. Beyond the COVID-19 pandemic, several factors may be attributed to the high prices of food commodities in Nigeria. It has been shown that some farming communities and other food value chain stakeholders are caught in the triangle of conflict, climate change and ineffectual policies (GAIN, 2020; OCHA, 2020).

5. Conclusion

The price of food products increased dramatically

during the nationwide lockdown and even worsened after the lockdown. The cost of yam, tomatoes, onions, pepper, and carrots experienced a massive (over 70%) increase in price during the lockdown. The enormous (over 70%) post-lockdown price differences were reported for alabo (cassava flour), yam, sweet potato, and bambara nut. Increased attention and support to eliminate/limit food system disruptions will boost food production, enhance physical accessibility and ultimately reduce food prices.

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Conflicts of Interest

The authors declare no conflict of interest

Ethics of human subject participation

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. Written consent was obtained from the respondents after the study scope and objectives were communicated to them.

Authorship: G.O.I, A.D.A, I.M.E, O.E.K, and O.C.O formulated the research concept and design. All authors except G.O.I and O.C.O were involved in data collection. G.O.I, L.E.O, H.C.E compiled and analyzed the data, G.O.I, A.D.A, I.E.M, N.C.A and E.A.O drafted the manuscript while O.C.O, L.E.O and H.C.E critically reviewed the manuscript. The final version submitted for publication was read and approved by all authors

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