



## **Socioeconomic, Dietary, and Anthropometric indices of selected households during the hit of COVID-19 in Ogun State, Nigeria**

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### **ABSTRACT**

The emergence of Coronavirus disease 2019 (COVID-19) has been found to greatly influence all aspects of human lives including economic, social, psychological, and nutritional well-being. This study assessed the socio-economic, dietary, and anthropometric indices of selected households during the hit of COVID-19 in Ogun state. The study was cross-sectional in design. A multistage sampling technique was used to select 300 households from the three senatorial districts. Data were obtained on socio-economic characteristics, anthropometric measurements, and dietary intake using a pre-tested structured questionnaire, standard anthropometric procedures, and food frequency questionnaire respectively. Data were analyzed using frequency counts, percentages, means, standard deviations, correlation, t-test, and Chi-Square. More than half (58.6%) of the respondents had no source of income during the lockdown, 37.7% had tertiary education and 26.4% earned ₦100, 000 - ₦199, 000 annually. The nutritional status of the household revealed that 29.9% of children 6-9 years and 23.5% of children 10-12 years were stunted, 24.7% of the mothers, and 28.3% of the fathers were overweight. The perceived adequacy of food consumed showed that 42% reported a reduction in the quantity of food consumed during the lockdown, 52%, 57.7%, and 63% perceived that their diet was inadequate in protein, fruits, vegetables, and dairy respectively. The emergence of COVID-19 threatened the socioeconomic, nutritional status, and food consumption pattern of the studied house, there is, therefore, a need for coping strategies that will improve nutrition and health status in cases of emergencies.

**Keywords:** Consumption pattern; Household; Anthropometry; COVID-19 Hit; Nutritional status

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## INTRODUCTION

The COVID-19 pandemic caused by the SARS-CoV-2 virus (referred to as the COVID-19 virus) posed an unprecedented threat to the global economy and one of the global major concerns is the impact of COVID-19 on food and nutrition security (**World Health Organization [WHO], 2020., High-Level Panel of Experts [HLPE], 2020**). Before the COVID-19 pandemic, Nigerians were faced with the problem of food and nutrition insecurity affecting 32.1 million people (**Food Security Information Network [FSIN] and Global Network Against Food Crises, 2020**). With the emergence of COVID-19, 3.65 million people were reported food and nutrition insecure as a direct result of COVID-19 (**Global Alliance for Improved Nutrition [GAIN], 2020**). The emergence of COVID-19 profoundly disturbed all aspects of human lives including economic, social, psychological, and nutritional well-being thereby creating multiple challenges (**Pietromonaco & Overall, 2020**) including financial income of the citizens, fears, and anxiety (**Giorgi et al, 2020**). These challenges have been found to influence relationships at the household level (**Pietromonaco & Overall, 2020**). According to the situation report of the Global Alliance for Improved Nutrition on the Impact of COVID-19 on Nigeria's Food Systems, households that were more exposed to COVID-19 or mobility-restricting lockdowns were more impacted by nutrition security (**GAIN, 2020**).

Following the outbreak, the World Health Organization (WHO) as a measure to curtail the spread of the virus and limit exposure introduced social distancing, social gathering restrictions and lockdown of educational institutions, stoppage of non-essential economic activities, and a temporary ban on domestic and international travel and trade (**Ewodage, 2020, Itheme et al., 2020**). For some people, working from home, and online or internet discussions and meetings are now normal practices. Food industry personnel, however, do not have the opportunity to work from home and are required to continue to work in their usual workplaces but the most unfortunate is that most of the petty traders who are selling non-essential commodities are not allowed during the lockdown to get to their selling place except for those that sell around the vicinity or a trekkable distance from the house (**WHO, 2020**). This is likely to increase the prevalence of overweight and obesity, as ultra-processed fast foods are available, and people have less physical activity (**Kendel Jovanović et al, 2021**). This lockdown through a grand measure to curb the spread of the virus results in the disruption of food supply chains by tightening credit access to farmers, limited access to inputs for farmers, transport services problems for farm produce, food importation limitation, lower incomes, and higher prices farm produce when available (**Andam et al, 2020., Ojokoh et al, 2022**), affecting individual access and right to food and slows down efforts to achieve Zero Hunger (**HLPE, 2020**). This has led many households to adopt negative coping strategies such as reliance on less expensive foods, reduced frequency, quantity, and quality of food consumed, reduced household portion sizes, borrowing foods, harvesting immature crops, and sending household members to beg among others (**United Nations High Commissioner for Refugees [UNHCR], 2020., Olajide et al, 2022**) which pose potential long-term effects to health and quality of lives.

It has been projected that the effect of COVID-19 on socioeconomic development will continue to circulate (**El Keshky et al, 2020**). Therefore, it is crucial to evaluate the socioeconomic, nutritional, and anthropometric variables of representative Ogun State families during the hit of the COVID-19 outbreak.

## MATERIALS AND METHODS

### Study Design

The study was descriptive and cross-sectional in design

### Study Area

The study was carried out in Ogun State, South-west, Nigeria. It was created in February 1976 from the former Western State. It lies within latitude 6.20N and longitude 3.00E 85.00E where it shares a boundary with the Republic of Benin on the west, Ondo State on the east, Oyo State on the North, and Lagos State on the south. As a result of its border with the Republic of Benin, it is called the gateway state. The state has a land area of 16,762 km<sup>2</sup> (constituting 1.9 percent of Nigeria's land area) and a population of 3,728,098 million with its growth rate placed at 2.83 percent per annum (**National Population Commission, 2010**). It comprises 20 Local Government Areas spread across three geopolitical zones which include; Abeokuta Central Senatorial District; Ogun West Senatorial District; and finally, the Ijebu Senatorial District. The soil and vegetation of Ogun state vary and its climatic condition favors the production of timber, trees, and arable crops such as cassava, maize, cocoyam, yam, melon, tomatoes, and local rice.

### Study Population

The study population comprised three members of the household (i.e. the father, mother, and any child within 6-12years)

### Sampling Size and Techniques

The sample size was estimated as 300 households using the Cochran formula for sample size determination at a 95% confidence level, margin error (5%), and a prevalence of 22.4% (**Olajide et al, 2022**). A multistage sampling technique was used. Six Local Governments were randomly selected from the 20 local governments in the three senatorial districts in Ogun State. Two wards were randomly selected from each of the Local Governments. Two communities were randomly selected from each of the two wards. Eligible households [Households with a father, mother, and child (6-12 years)] in each of the communities were numbered and systematic sampling was used in household selection until the minimum sample size was achieved.

### Method of Data Collection

This study employed the use of primary data. The socioeconomic characteristics such as household size, educational level, household family income, and household income distribution among others were assessed using a semi-structured questionnaire. The anthropometry data of the parents such as the weight and height of the parents were assessed using a calibrated portable electronic weighing scale and height meter (**Food and Nutrition Technical Assistance III Project [FANTA], 2016**), and the body mass index was calculated and classified using a standard procedure (**WHO, 2000**). The anthropometry data of the children were measured using standard procedures described by **Kristen and Lesley (2018)**, the data were analyzed using

WHO Anthro and classified using **WHO (2008)** growth standards into Weight-for-height (Wasting), Height-for-age (Stunting), and body mass index (BMI) for- age (Underweight). The food consumption pattern of the respondents was assessed using the food frequency questionnaire described by the **Food and Agriculture Organization [FAO] (2018)**. The questionnaire contained a list of commonly eaten foods and beverages in the study which were classified into food groups, the frequency of consumption was categorized into 0days, 1-3days, 4-6days and greater than 6 days i.e. every day, and respondents were asked to indicate their typical frequency of consumption over in the past one week (*Moskal et al, 2014*). The impact of the lockdown on food purchasing and adequacy was assessed using a semi-structured questionnaire described by **Samuel et al (2021)**.

### **Ethical Considerations**

Before the data collection, written permission was obtained from the Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta which was submitted to the Local Governments. The study instruments were assessed and respondent consent was obtained before the commencement of the study. The households whose consent cannot be obtained were excluded from the study.

### **Statistical analyses**

Data were sorted and analyzed using descriptive and inferential statistical analysis techniques. Quantitative data such as socioeconomic, demographic characteristics, and anthropometry measurements were analyzed using the Statistical Package for Social Sciences (SPSS) version 20 (IBM, USA), and the results were presented using frequencies and percentages. The children's anthropometric data were analyzed using WHO anthro and EPI info version 6.02 and transferred to the Statistical Package for Social Science (SPSS) 20.0 for further analysis. Significant association between the dependent and independent variables was tested at  $P < 0.05$  using the Chi-square test.

## **RESULTS AND DISCUSSION**

### **Socioeconomic Characteristics of Respondents**

The socioeconomic characteristics of the respondents are depicted in Table 1 below. The result showed that 43.7% and 35.3% of the fathers and mothers had secondary education, respectively, and 51% of the respondents were from households with sizes 1-4. The majority (40%) of the respondents had wells as their primary source of water and 10% depended on rivers as their primary water source. More than half (57.3%) of the respondents used a water closet and 31.4% used a pit latrine as their toilet type. The annual income of the family revealed that the majority (93.6%) of the household earned less than ₦500,000 per annum. The main source of income of the studied respondents is Agriculture (17.3%), Skilled workers (27.3%), Employment (28%), and 5.7% had no work. The majority (58.7%) had no source of income during the lockdown, whereas 12.3% and 12.4% of the respondents depended on agricultural income and salaries respectively. More than half (53%) distributed their annual income equally on food, education, and health, 13% spent all on food, and only 9.6% saved most of their income.

**Table 1: Socioeconomic characteristics of the family (n=300)**

<b>Characteristics</b>	<b>Frequency</b>	<b>Percent (%)</b>
<b>Childs Age</b>		
6-9 Years	165	55
10-12 Years	135	45
<b>Educational level of the fathers</b>		
No formal education	17	5.7
Primary education	43	14.3
Secondary education	131	43.7
Tertiary education	109	36.4
<b>Educational level of the mothers</b>		
No formal education	23	7.7
Primary education	58	19.3
Secondary education	106	35.3
Tertiary education	113	37.7
<b>Household Size</b>		
1-4	153	51
5-8	100	33.4
Above 8	47	15.6
<b>Primary Water Source</b>		
Spring/river	30	10
Well	120	40
Borehole	101	33.7
Pipe borne water	49	16.4
<b>Type of toilet</b>		
Pit latrines	94	31.4
Water closet	172	57.3
Bush	34	11.3
<b>Average Annual Income of the Family (₦)</b>		
<100, 000	30	10
100,000-200,000	79	26.4
200,001-300,000	82	27.3
300,001-400,000	58	19.3
400,001-500,000	32	10.6
Above 500,000	19	6.3
<b>The main source of income</b>		
Agriculture	52	17.3
Employee	84	28
Daily worker	65	21.7
Skill worker	82	27.3
Has no work	17	5.7
<b>Source(s) of money during the lockdown</b>		
Grant from Government	13	4.3
Agriculture	37	12.3
Salaries	37	12.4
Trading (essential commodities)	20	6.6
None	193	58.7
<b>Distribution of the income during the year</b>		
Equally to food, education, and health	159	53
Most for food	39	13
Most for education	54	18
Most for health	19	6.4
Save most of it	29	9.6

### Nutritional Status of the Respondents

Table 2 below describes the nutritional status of the respondents (parents and children). The result showed that 24.7% and 28.3% of the fathers and mothers were underweight, respectively, and only 1.7% and 5% of the fathers and mothers were obese. The nutritional status (underweight, normal, and overweight) was statistically significant between the fathers and mothers. In addition, for children between 6-9 years, 29.9%, 4.9%, and 12.8% were stunted, wasted, and underweight respectively, whereas 39.7% of the children aged 10-12years were malnourished (stunted, wasted, and underweight).

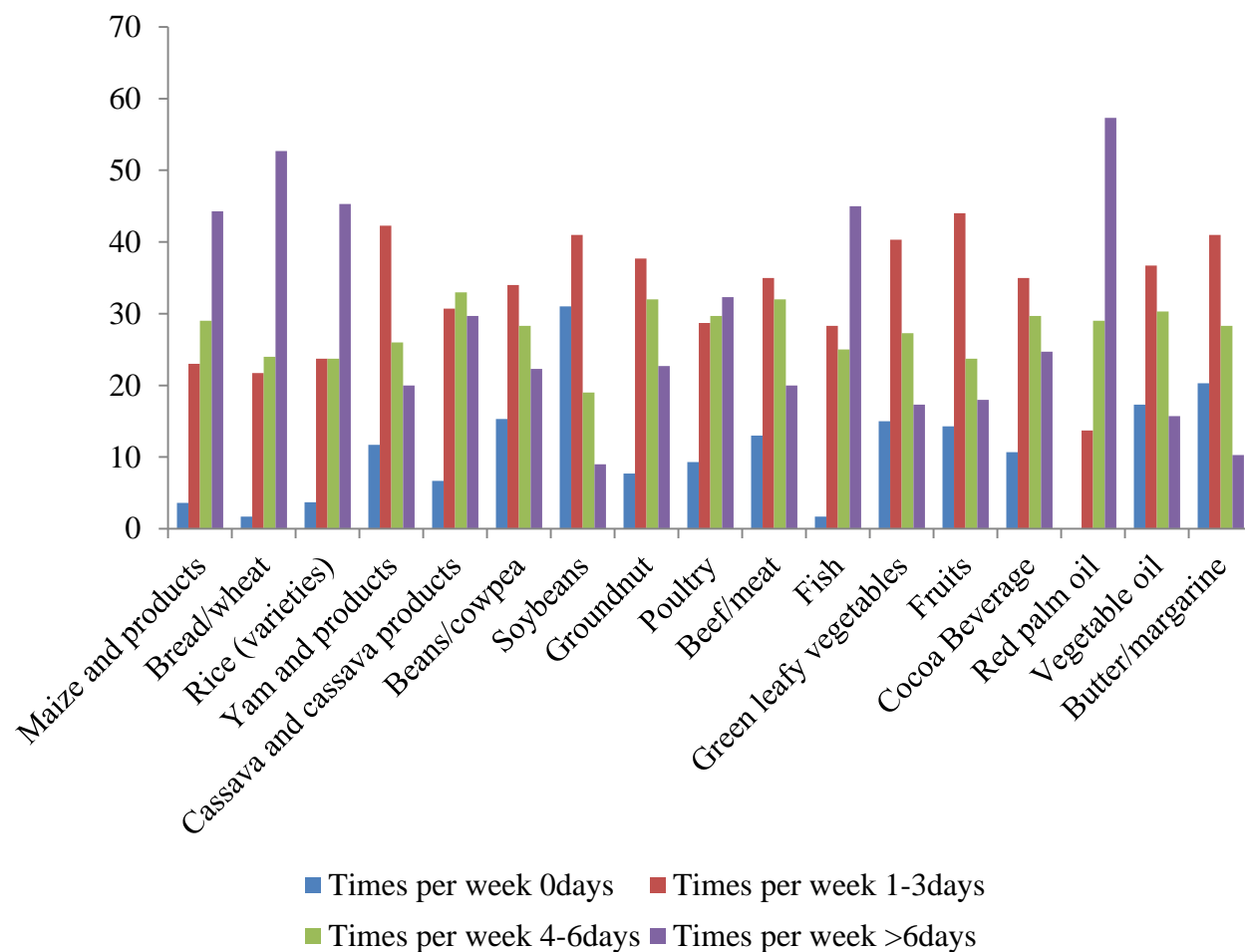
**Table 2: Nutritional status of the respondents**

<b>Parents</b>			
<b>Variables</b>	<b>Fathers N (%)</b>	<b>Mothers N (%)</b>	<b>P-Value</b>
Underweight	74(24.7)	85(28.3)	0.000*
Normal	198(66.0)	168(56.0)	0.016*
Overweight	23(7.6)	15(10.7)	0.001*
Obese	5(1.7)	15(5.0)	0.093
<b>Children</b>			
<b>Variables</b>	<b>6-9yrs N (%)</b>	<b>10-12yrs N (%)</b>	<b>P-Value</b>
Stunting	49(29.9)	32(23.5)	0.002*
Wasting	8(4.9)	4(2.9)	0.010*
Underweight	21(12.8)	18(13.2)	0.006*
Normal	86(52.4)	82(60.3)	0.061

\* Statistically Significant at  $p < 0.05$

### Food Consumption Pattern of the Respondents

Figure 1 below describes the food consumption pattern of the respondents. Maize, bread, and rice were mostly consumed by the majority (44.3%, 52.7%, and 45.3%) of the respondents more than six days per week respectively. Yam and cassava products were consumed 1-3 days per week by 30.7% and 34% of the respondents, respectively. In addition, 41% and 37.7% of the respondents consumed soybeans and groundnuts 1-3 days per week. Fish was consumed by 45% of the respondents compared to poultry (32.3%) and beef (20%). Less than half (40.3% and 44%) of the respondents consumed green leafy vegetables and fruits 1-3 days per week respectively, and only 17.3% and 18% consumed vegetables and fruits more than six days per week. More than half (57.3%) of the respondents consumed palm oil more than six days per week compared to vegetable oil and margarine which are consumed by 15.7% and 10.3% of the respondents more than six days per week respectively.



**Figure 1: Food consumption pattern of the respondents**

### **Perceived adequacy of Food Consumption before and during the pandemic of the Respondents (Mothers)**

Perceived adequacy of food consumption before and during the pandemic was shown in Table 3; the results showed that 58% of the respondents opined that there is a difference in the quantity of food consumed before and during the pandemic i.e. reduction in the quantity with the majority (58%) of the respondents stating insufficient money to buy foodstuffs as the cause of the reduction in food quantity. The majority (66%) of the households had reasons to skip meals before and during the pandemic and insufficient money to buy foodstuffs (34.8%), Sickness (9.1%), fear of not being able to get what to buy (24.7%) and inadequate food in stock (31.3%) are the reasons for skipping meals among the households. More than half (56%) of the respondents agreed that more quality foods were consumed before the outbreak; 52%, 57.7%, and 63.7% agreed the quality before the outbreak was better in terms of adequate protein-based foods, sufficient fruits, and vegetables consumption, and adequate dairy foods consumption, respectively.

**Table 3: Perceived influence of lockdown situation on food purchasing and consumption adequacy before and during the pandemic of the respondents (Mothers)**

Variables	Yes	No
1. Do you think there is a reduction in the quantity of food consumed before and during the pandemic?	174(58)	126(42)
2. If there is, what caused it? (N=174)		
• Insufficient money to buy foodstuffs	77(44.3)	
• Sickness	25(14.4)	
• Fear of not being able to get what to buy	72(41.3)	
3. Do the household have any reason to skip a meal	198(66)	102(34)
4. If Yes, what are the reasons? (N=198)		
• Insufficient money to buy foodstuffs	69(34.8)	
• Sickness	18(9.1)	
• Fear of not being able to get what to buy	49(24.7)	
• Inadequate food in stock	62(31.3)	
5. Is the food consumed by the household adequate in quality better than before the outbreak of COVID	132(44)	168(56)
If NO, what are the reasons? (N=168)		
• Insufficient money to buy foodstuff		62(36.9)
• Fear of running out of stock		58(34.5)
• That is available foodstuff		48(28.6)
6. Do you think your protein-based foods are adequate?	144(48)	156(52)
7. Do you think you consume enough fruit and vegetables	127(42.3)	173(57.7)
8. Do you think you consume adequate dairy foods	109(36.3)	191(63.7)

### Relationship between Socioeconomic characteristics and the Nutritional Status of Children

Table 4 describes the relationship between socioeconomic characteristics and the nutritional status of the children. The result showed that there is a strong relationship between parents' educational level, household size, average annual income, and stunting among the children. Wasting, educational level, source of water and average family annual income were statistically significant. In addition, underweight, educational level, household size, and average annual income were statistically significant.

**Table 4: Relationship between Socioeconomic characteristics and the Nutritional status of the Children**

Variables	Stunting			Wasting			Underweight		
	X <sup>2</sup>	Df	p-value	X <sup>2</sup>	Df	p-value	X <sup>2</sup>	Df	p-value
Education	53.123	16	0.002*	31.213	12	0.003*	35.120	12	0.001*
Household size	32.213	10	0.005*	15.821	9	0.164	23.2263	11	0.031*
Water source	14.512	9	0.065	29.641	12	0.004*	15.672	9	0.1162
Av. Annual income	71.452	18	0.001*	75.555	17	0.000*	41.432	12	0.000*
X <sup>2</sup> - Chi-square	Df- degrees of freedom (df)		*Significant at p<0.05						



## Discussion

The COVID-19 pandemic has affected all sectors of economies globally leaving a drastic impact on food and nutrition security. Research has shown that lack or delayed access to sufficient nutritious food can predispose individuals to malnutrition and its manifestation in poor immune function, stunting, and higher child mortality among others (**Rytter et al., 2014**). There are important links between the socioeconomic status of households, food availability, and accessibility. The result showed that there was poor socioeconomic status of the households and malnutrition is prevalent among the study population. The majority of the respondents reported that the COVID-19 lockdown affected their consumption pattern with its impact on purchasing power and access to nutritious food. The study also established a strong relationship between the socioeconomic status of the respondents and the anthropometric indices of the respondents.

The socioeconomic characteristics of the respondents revealed that less than half of the respondents had tertiary education, and less than 10% had an average annual income of more than #500,000. Education, Housing, and Household size are important determinants of health. **Rolfe et al (2020)** noted poor poor-quality housing, can negatively influence health and well-being. **Zajacova and Lawrence (2018)** observed that adults with lower educational attainment have a greater risk of poor health. **Galgamuwa et al, (2017)** also reported a declining trend of child malnutrition in Sri Lanka among mothers with improved educational levels. This implies that the majority of the respondents might not be able to utilize effectively the nutrition and health information on social media on measures to improve the nutritional status of households during the COVID-19 lockdown.

**Farzana et al, (2020)**, and **Thurlow (2020)** reported that the earning capacity of families in developing countries declined by 40-80% as a result of the COVID-19 lockdown. This study also agreed with the claim as more than half of the respondents reported that they had no source of income during the lockdown and few relied on grants, agriculture, and trading of essential commodities as sources of income. This result is also in consonance with an online study conducted in six Nigerian states (**Iheme et al, 2020**) which reported that more than half of the respondents in the study reported a reduction in their income during the COVID-19 lockdown.

The result showed that about one-third of the parents were underweighted while a good number of children were stunted and this result is in agreement with the result reported in Ogun state (**Olajide et al, 2022**) where more than half (59.7%) of the children were stunted. The relatively high prevalence of undernutrition observed among the households in this study may be because most of these parents are of low socio-economic status and live in poor houses where unhygienic living standards, unsafe drinking water, and unsanitary conditions of the immediate environment prevail and aggravated by the hit of COVID-19 lockdown.

The food consumption pattern of the respondents showed that the majority of the respondents consumed more maize, yam, cassava, and their products compared to poultry, beef, and fish. Less than half of the respondents consumed green leafy vegetables and fruits 1-3 days per week, respectively, and only a few consumed vegetables and fruits more than 6 days per week. This poor consumption pattern can be said to result from impaired food access and declination in household income and savings. This claim is supported by the **Food Security Information**

**Network [FSIN] and Global Network Against Food Crises (2020)** which reported that highly nutritious foods, such as fruit, vegetables, and protein-rich products, are often replaced with cheaper foods, such as those derived from staple cereals as people's incomes and savings are eroded. This increases the susceptibility of the respondents to protein and micronutrient deficiencies.

Socioeconomic status has been identified as one of the factors influencing food consumption and nutritional status of individuals, households, and societies (**Jayanata et al, 2022**). According to **Wang and Tang (2020)**, the COVID-19 pandemic has long-term socioeconomic influence on the people's financial income and the environment where they live. The majority of the respondents in this study reported COVID-19 lockdown decreased their quantity of food intake and skipped meals due to financial constraints and insufficient money to buy foodstuff. This result aligns with other studies (**Mossa-Basha et al, 2020., Okondu et al 2021**) that reported households' financial downturns resulting from COVID-19 the pandemic lockdown. In an online study conducted by **Samuel et al (2021)**, 48.2% of the respondents experienced insufficient money for food expenditure during the lockdown. In order to deal with the food and nutritional difficulties brought on by the COVID-19 pandemic lockdown, households in Ogun state turned to strategies such as relying on less preferred and less expensive foods, limiting household portion size, and decreasing the number of daily meals (**Olajide et al, 2022**).

**Zhu et al (2022)** identified difficult access to quality foods as one of the contributors to the increased prevalence of malnutrition during the COVID-19 pandemic. In this study, more than half of the respondents agreed that more quality foods were consumed before the outbreak; and the majority reported a decrease in the quality of protein-based foods, sufficient fruits and vegetables, and adequate dairy foods. This can be attributed to the consequences of the lockdown such as decreased food access, increased post-harvest losses, and high cost of nutritious foods. **Global Alliance for Improved Nutrition (2020)** affirmed that the post-harvest losses of 20% for fish and 50-60% for fresh fruits and vegetables before COVID-19 were further complicated by the pandemic. Generally, healthy diets including fish, dairy, and milk are considered to be of high cost (**Herforth et al, 2020**). However, the **Global Alliance for Improved Nutrition (2020)**, and **FSIN, and Global Network Against Food Crises (2020)** opined that the COVID-19 lockdown resulted in an increment in the prices of key nutritious food items. All these disruptions to the demand and supply chain hampered food access and food consumption patterns of the respondents. The implication of the reduced quality and quantity of food consumed may prone the household to nutritional deficiencies and promote an inter-generational cycle of malnutrition

It is important to note that the socioeconomic characteristics of the households before COVID-19 are not known and this study does not distinguish between households with poor and good socioeconomic status before the lockdown, the impact is based on self-reported data and the extent of the impact cannot be established. This should be considered in interpreting the result of this study.

## **CONCLUSION**

This study showed that the COVID-19 lockdown hit the socioeconomic status of the households in the study and also impacted the nutritional status of the study population. The consumption pattern was also imparted with significantly low consumption of proteinous foods, fruit and vegetables, and dairy products. The study therefore concluded that there is a strong relationship between the socioeconomic characteristics and anthropometric indices of the respondents in this study. Socioeconomic, nutrition, and health assistance programs to improve socioeconomic status and nutrition and health status among the respondents should be promoted.

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### **Authors' Contributions**

This study was carried out in collaboration between all authors. All the authors contributed substantially to the conceptualization and design of the study, data collection, and analysis, and drafting and reviewing the manuscript.

### **Competing Interest**

The authors have declared that there is no competing interest.

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