



COVID-19 pandemic lockdown's potential influence on nutritional security and status of children under five (CU5) in Shomolu, Lagos

Ifeoma Akeredolu, Abosede Rufus, Madesola Adegeye & Favour Chinedu
Lagos State, Nigeria

Abstract

The COVID 19 pandemic was identified by the World Health Organization (WHO) as a health and human crisis that affected the food security and nutrition of millions of people all over the world. In an attempt to stop the virus from spreading, the government of Nigeria imposed a national lockdown. This had impact on production, supply and access to key staples with consequent rise in prices, limiting affordability and access to food amongst other issues of feeding practices. The goal of this study was to determine how the COVID 19 pandemic lockdown affected the food security, nutrition and health of children under the age of five (CU5). A structured questionnaire was used to collect information on nutrition security and feeding patterns of CU5 from 200 mothers randomly sampled from the study area. Anthropometric data was also used to determine the nutritional status of children. The results were analyzed using descriptive and inferential statistics. The food frequency distribution before the pandemic revealed that consumption was between six to seven times weekly for all food groups while consumption dropped to two to three times weekly during the lockdown, consequently about 35% of children sampled had severe acute malnutrition, 7.5% were wasted, 18.5% underweight and 48.5% stunted. The result showed significant relationship between caregivers' socio-demographic characteristics and nutritional security and feeding patterns of CU5. It showed an inverse relationship between COVID-19 pandemic lockdown and the nutritional security and status of CU5. As the employment status of parents/caregivers declined by 18%, unemployment increased by 4.5% and self-employment increased by 3.5%. This affected food availability, affordability and accessibility which was about 74% before the lockdown but dropped to about 57% during the lockdown. It is recommended that mothers receive nutrition education on good feeding practices, also government and non-government organizations (NGOs) are advised to intervene in the provision of food for CU5, particularly during emergencies and also provide an environment for self and economic empowerment that can reduce the vulnerabilities of children and caregivers to poor nutrition.

KEYWORDS: NUTRITIONAL SECURITY, NUTRITIONAL STATUS, COVID-19 LOCKDOWN, CU5.

Introduction

Diet is a factor that determines children's ability to grow, develop, and learn to their full potentials. A UNICEF (2019) report observed that one out of every three children under the age of five was undernourished or overweight, and one out of every two suffered from hidden hunger. This indicates high tendencies of food and nutritional insecurities which jeopardize millions of children's ability to develop their full potentials. Nutrition security is achieved with

Akeredolu, I., Rufus, A., Adegeye, M., & Chinedu, F. (2022). COVID-19 pandemic lockdown's potential influence on nutritional security and status of children under five (CU5) in Shomolu, Lagos. *International Journal of Home Economics*, 15(2), 129-137.

access to sufficiently nutritious diet combined with a hygienic environment, appropriate health services and care to enable a healthy and active life for all household members, (FAO et al. 2012). Although nutrition security necessitates food security, the two concepts are sometimes used interchangeably to stress both food and health requirements (Weingartner, 2013). Household food insecurity has been shown to have detrimental impacts through limited varieties, nutrient intake, and nutritional status of household members (Osei et al 2010). Nutritional status of children (being most vulnerable to nutritional imbalances) is a key indicator for measuring the nutritional and health conditions of a community experiencing a food crisis (Jesmin et al 2011).

According to nutritional studies, attempts in many developing countries to improve the quality of children's dietary intake have been incredibly slow (Crawley 2004), owing to a range of factors such as rising food commodity prices amongst others (Keikhaei et al 2007). Income was observed to be a crucial driver of nutritional status in a study carried out by Salois et al. (2012) on the impact of income on nutrient consumption, also a connection between calories consumption disaggregation and its relationship with income was established. Carbohydrate consumption was found to have a positive elasticity at low-income levels but a negative elasticity at high income levels.

The COVID 19 pandemic, though a human health crisis affected the economy and general livability of global population, threatening food security and nutrition of millions globally. The devastating influence on the economy caused unprecedented recession and impoverishments. As a result of the pandemic and the consequences that came with it, millions of people, especially the low economic strata became vulnerable, lacking adequate food and malnutrition. Hence, Income level is associated with food demand, livelihoods and security, (Torero 2020, Arndt 2020, Samuel et al (2021)). This was depicted in the increased food insecurity and rising unaffordability of healthy diets. As at 2019, 690,000,000 people, or 8.9% of the world's population, were undernourished, 135,000,000 were in hunger crises or worse in 55 countries, and 2,000,000,000 people lacked regular access to safe, nutritious, and sufficient food (FAO et al., 2020). According to World Food Programme, (2020) the COVID-19 crisis was observed to have worsened the hardship and may lead to an additional 121,000,000 people faced with extreme food insecurity by the end of 2020.

In 2020, 22.0% (149,200,000) of children under the age of five were estimated to have stunted growth, 6.7% (45,400,000) wasting, and 5.7% (38,900,000) overweight. (FAO, IFAD, UNICEF, World Food Programme, and WHO, 2021).

In 2019, Nigeria had a Global Hunger Index (GHI) score of 27.9, placing it in the serious category. These statistics show that Nigeria lags behind in meeting the SDG 2 target of eradicating all forms of hunger, achieving food security, improved nutrition, and sustainable agriculture by 2030. This is worsened by the pandemic as food production and distribution is affected by other factors such as climate change and poverty. The pandemic has impacted the agricultural sector which has influenced food security negatively and in turn the nutritional security of people especially children under the age of five. Nigeria Demographic and Health Survey (2013) revealed that 37% of children under the age of five in Nigeria were stunted, while 21% were severely stunted, 18% wasted and 9% severely wasted while 29% were underweight, with 12% being severely underweight. A study in Tanzania among CU5 revealed that 41% were stunted, 18.8% were underweight and 7.3% were wasted, making stunting the most prevalent form of malnutrition experienced among CU5. Another study among preschool children in south-west Nigeria found a prevalence of 8.1%, stunting, 7.7% underweight and 1.9% wasting. (Onifade et al., 2019)

The COVID-19 pandemic brought about social and economic crisis that rapidly increased the ongoing nutrition insecurity in Nigeria, (Federal Ministry of Health, 2020). The lockdown had drastic effect on the food supply system which affected food availability, pricing and quality (Barrett 2020). Terazono and Munshi (2020) also observed that the demand for perishable commodities decreased significantly because of the lockdown. Several studies have been carried out on the nutritional status of children in Nigeria however, there is a paucity of published data on the nutritional status and security of CU5 before and during the COVID-19 lockdown. In view of the above, this study was conducted to determine the potential influence of COVID-19 pandemic lockdown on the nutritional status and security of children under 5 (1-3 years of age toddlers) in Shomolu Local Government Area of Lagos State.

Methodology

Study location and Research Design

The study was conducted in Shomolu Local Government Area (LGA) of Lagos State, Nigeria. It was randomly selected from the Lagos east senatorial district. The LGA is made up of eight communities (Onipanu, Okesuna/Alase, Igbari, Fadeyi/Igbobi, Bashua, Orile/Alade, Bajulaiye and Ijebu-Tedo). These communities are predominantly indigenous ethnic groups of different socio-economic stratifications. The people in the communities are either civil servants, workers in the private industries or self-employed.

The study used primary and secondary data to determine the influence of COVID-19 pandemic lockdown on the nutritional status and security of toddlers in Shomolu LGA. Structured questionnaire was used to solicit information from mothers of children under five years, ages 1-3 years (toddlers). The questionnaire comprised of four Sections; socio-demographic characteristics, Anthropometric parameters, Food Availability and Accessibility and Food Frequency Questionnaire (FFQ). A random sample of 200 mothers with children ages one to three was randomly selected from the LGA. Information about the nutritional status and security of toddlers was elicited via the questionnaire. The instrument was designed to assess information on nutritional status and security of toddlers as well as determine the children's feeding pattern before and during the COVID-19 Pandemic lockdown.

Descriptive and inferential statistics such as Cross tabulations, frequency distribution and Chi-square (x^2) test were employed to describe the socio-demographic characteristics and nutritional security. Nutritional status was determined using WHO Child Growth Standards (2006), Z-scores, which was used to calculate the indicator prevalence for; Child Weight-for-age [(WAZ) Weight for Age Z score: $-1 < WAZ < 0$ Well Nourished, $-2 < WAZ < -1$ Mild underweight, $3 < WAZ < -2$ Moderate underweight, $WAZ < -3$ Severe underweight] Child Height-for-age [(HAZ)-Height for Age Z Score: $-1 < HAZ < 0$ Well Nourished, $-2 < HAZ < -1$ Mild Stunting, $-3 < HAZ < -2$ Moderate Stunting, $HAZ < -3$ Severe Stunting] Child Weight-for-height [(WHZ) Weight for Height Z score: $-1 < WHZ < 0$ Well Nourished, $-2 < WHZ < -1$ Mild Wasting, $-3 < WHZ < -2$ Moderate Wasting, $WHZ < -3$ Severe Wasting]. Mid Upper Arm Circumference (MUAC) parameters were used to determine the prevalence of malnutrition, 0-11cm on the MUAC Tape indicating severe Malnourishment (Red), 11-12.5cm indicating mild Malnourishment (Yellow) and 12.5-20cm indicating good nourishment (Green).

Result and Discussion

The socio demographic characteristics of respondents showed that 56.5% of mothers had tertiary education, 36% had secondary education and only 7.5% primary education. Reported educational level of spouses showed that 74.5% had tertiary education, 20.5% had secondary education and only 5% had primary education. The employment status of mothers before the pandemic showed that 40.5% were employed, 34.5% were self-employed and only 20% were

unemployed. Reported employment status of spouses before the pandemic showed that 56% were employed, 23.5% were self-employed and only 20.5% were unemployed. The employment of mothers during the pandemic showed that 31% remained employed, 39.5% were self-employed and 29.5% were unemployed. The reported employment status of spouses during the pandemic showed that 47.5% were employed, 28% were self-employed and 24.5% were unemployed. The employment status of mothers and their spouses showed a slight variation during the pandemic compared with the period before the pandemic. Although both parents' employment status remained good, fathers' employment status dropped by 8.5% and that of mothers dropped by 9.5%. The percentage of parents in self-employment increased slightly, mothers at 5% and fathers at 4.5%.

The monthly income distribution of mothers showed that only about 15.5% earned above \$217 before and during the pandemic, while 19.5% earned between \$145-\$217 before the pandemic and 15.5% during the pandemic resulting in a decline of about 4%. About 22.5% of mothers earned between \$73 and \$145 before the pandemic and about 23.5% earned the same amount during the pandemic. About 42.5% of mothers earned less than \$73 before the pandemic and about 46% earned less than \$73 during the pandemic. This implies that while some mothers lost their jobs, others had income reduction during the pandemic. The reported income of fathers also showed a reduction as about 26.5% earned above \$217 before the pandemic and 24.5% during the pandemic indicating a reduction of about 2%. About 21% of fathers earned between \$145 and \$217 before the pandemic and 14% during the pandemic indicating about 7% decline. About 29% earned between \$73-\$145 before the pandemic and 26% during the pandemic indicating a 3% reduction in income. While about 23.5% earned less than that before the pandemic which increased to 35.5% during the pandemic.

The job loss during the pandemic lockdown has significant implications for income which is one of the indicators for measuring child food and nutrition security, and this can further aggravate malnutrition amongst the children. This also implies that as parents' income reduce, the purchasing power of good, adequate and nutritious food for their children will be affected, thereby leading to nutrition insecurity. This further shows that income is a major determinant of food and nutrition security. This finding is similar to that of Arndt et al. (2020) who posited that a reduction in the total household income will jeopardize household food security during the pandemic. It however agrees with the findings of Samuel, et.al. (2021) who reported that income level was associated with experience of food insecurity during the lockdown.

Food Frequency Distribution Before and During the Lockdown

Before the lockdown majority (41.6%) of the CU5 consumed starchy foods (Cereals, grains, roots and tubers) 6-7 times weekly whereas during the lockdown, consumption reduced to 2-3 times weekly for majority (46%). The frequency of protein consumption (Poultry, meat, fish, dry beans and nuts) among majority of them (38%) was 6-7 times weekly before the lockdown and for majority (50%) during the lockdown the frequency of consumption reduced to 2-3 times weekly. For milk and milk products, consumption for majority (38.5%) was 6-7times weekly and reduced to 2-3times weekly for most of them (49.9%). Frequency of consumption of fats and oil for most of the respondents (37%) before the lockdown was also 6-7 times weekly and this reduced to 2-3 times weekly (45%). Similarly, the frequency of consumption of fruits and vegetables for majority of CU5 (34% vegetable, fruits 31%) was 6-7 times weekly and also reduced to 2-3 times weekly (vegetable 46.5%, fruits 45.5%). All the above confirm that availability and accessibility of food during the lockdown was hampered.

The result from this study shows that during the lockdown, the food and nutrition security of the children was compromised because majority of the respondents lacked healthy feeding habits according to the food frequency distribution result. This implies that the feeding habits of the children was majorly affected during the COVID-19 pandemic lockdown and led to high

malnutrition among CU5, since feeding frequency is a determinant of food and nutrition security. The drastic reduction in the consumption of fruits and vegetables is similar to the observation of Terazono and Munshi (2020) that there was a decline in demand for perishable commodities significantly during the lockdown.

Table 1: Food Frequency Distribution

Food Group	Before Pandemic				During Pandemic			
	Once	2-3 times	4-5 times	6-7 times	Once	2-3 times	4-5 times	6-7 times
Starchy foods: Cereals, grains, roots and tubers	13 (6.5%)	52 (26%)	52 (26%)	83 (41.5%)	28 (14.0%)	92 (46.0%)	63 (31.5%)	17 (8.5%)
Poultry, meat, fish, dry beans and nuts	21 (10.5%)	54 (27.0%)	49 (24.5%)	76 (38.0%)	39 (19.5%)	100 (50.0%)	58 (29.0%)	3 (1.5%)
Milk and milk products	6 (8.0%)	55 (27.5%)	52 (26.0%)	77 (38.5%)	29 (14.5%)	99 (49.5%)	67 (33.5%)	5 (2.5%)
Fats and oil and sweets	24 (12.0%)	55 (27.5%)	47 (23.5%)	74 (37.0%)	42 (21.0%)	90 (45.0%)	46 (23.0%)	22 (11.0%)
Vegetables	25 (12.5%)	61 (30.5%)	46 (23.0%)	68 (34.0%)	47 (23.5%)	93 (46.5%)	54 (27.0%)	6 (3.0%)
Fruits	24 (12.0%)	61 (30.5%)	53 (26.5%)	62 (31.0%)	51 (25.5%)	91 (45.5%)	53 (26.5%)	5 (2.5%)

Food Availability and Accessibility (Before the Lockdown)

Food availability and accessibility before the lockdown was 81.0% as respondents claimed to have got different types of food before lockdown while 19.0% did not have food at their disposal. Also, 59.5% of mothers did not experience increase in food prices, 40.5% of them experienced increase in food prices before the lockdown. It was observed that 75.5% of mothers had enough money to purchase food items needed by the family while about 24.5% did not have enough money to purchase food items before the lockdown. A larger percent of caregivers (76.5%) purchased food items based on household preferences while 23.5% purchased based on household needs. Majority (71.5%) of mothers were able to purchase all food items needed by the family while 23.1% could not purchase all their food items. Most (81.0%) of them said all their preferred food items were available at the market before the lockdown while 19.0% reported that their food preferences were not available at the market before the lockdown. Majority (90.5%) of caregivers got fresh food items at the market before the lockdown while very few (9.5%) were unable to get fresh food items at the market before the lockdown.

Food Availability and Accessibility (During the Lockdown)

Majority of mothers (61.0%) were able to have access to different types of food during the lockdown. About 92.5% of mothers agreed that there was an increase in food prices compared to 7.5% who did not experience any increase in food prices. It was also observed that 58.0% caregivers did not have enough money to purchase food items needed by the family while 42.0% of them could afford to purchase family needs. About 35.5% of mothers purchased food items based on preferences while more than half (65.5%) of caregivers purchase of foods items were not based on their preferences during the lockdown. Majority 72.0% of mothers confirmed that all their preferred food items were available in the market during the lockdown while 28.0% were unable to get their preferred food items in the market during the lockdown. About 87.5% of mothers were not breastfeeding during the lockdown while 12.5% were still breastfeeding their toddlers. The availability and accessibility of food before and during the lockdown reveal

a huge gap compared to the variation observed in income during these periods. Children in one year bracket experienced about 10% decline in their food consumption, children in age two category experienced about 15% decline while children in age three category experienced 15.5% decline.

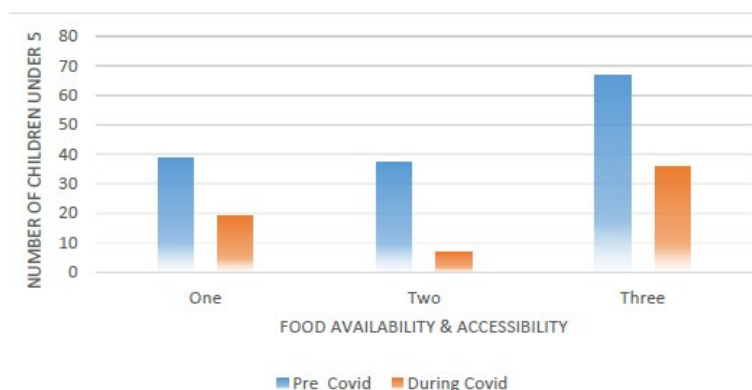


Figure 1: Food availability and accessibility by children age one to three pre-COVID and during lockdown

The result on Table 2 describes the nutritional status of the CU5. 7.5% were wasted (4.5% mild, 2.5% moderate and .5% severe). Wasting depicts Low weight-for-height and helps to identify children suffering from current or acute under nutrition or wasting. It is appropriate for examining short-term effects such as seasonal changes in food supply or short-term nutritional stress brought about by illness. So many of the children (48.5%) were stunted (20.5% mild, 18.0% moderate and 10.0% severe). Stunting which depicts Low Height-for-age index identifies past under-nutrition or chronic malnutrition. It is associated with a number of long-term factors including chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty. It is possible that these children were already stunted before the lockdown or that they became so due to the unavailability and or lack of access to protein-rich and energy foods, as shown in the result of their reported frequency of consumption. In children over 2 years of age, the effects of these long-term factors may not be reversible. About 18.5% were underweight (12.5% mild, 3.5% moderate and 3.5 severe). Underweight is identified by a low weight-for-age index. This index reflects both past (Chronic) and/or present (acute) under nutrition (although it is unable to distinguish between the two).

Table 2: Nutritional Status of the Under Five Children

Classification	Normal	Mild	Moderate	Severe
WHZ	54 (27.0)	9 (4.5)	5 (2.5)	1 (0.5)
HAZ	69 (34.5)	41 (20.5)	36 (18.0)	20 (10.0)
WAZ	90 (45.0)	25 (12.5)	7 (3.5)	7 (3.5)

Note: WHZ-Weight for Height z-score; HAZ-Height for Age z-score; WAZ-Weight for Age z-score; MUAC-Mid Upper Arm Circumference for Age z-score; BAZ-BMI for Age z-score

This result in this study is higher than that obtained by of Onifade et al. (2019) which indicated that among preschool children, there was 8.1% stunting, 7.7% underweight and 1.9% wasting. It is however similar to the findings of Nicodemus et al., (2019) in a study in Tanzania among CU5 that showed 41% stunting.

The age-MUAC distribution result also showed that about 11.0% of children of age 1, have severe acute malnutrition, with about 5% moderately malnourished, while 7.0%, were at risk for acute

malnutrition and only 4.5% were well nourished. For children two years old, about 12.0% of them had severe acute malnutrition, 7.0% were moderately malnourished, 6.5% were at risk for acute malnutrition and only 28.5% of them were well nourished. About 12.5% of children age 3 had had severe malnutrition, about 7.5% were moderately malnourished, 10.0% were at risk for acute malnutrition and only 14.0% were well nourished.

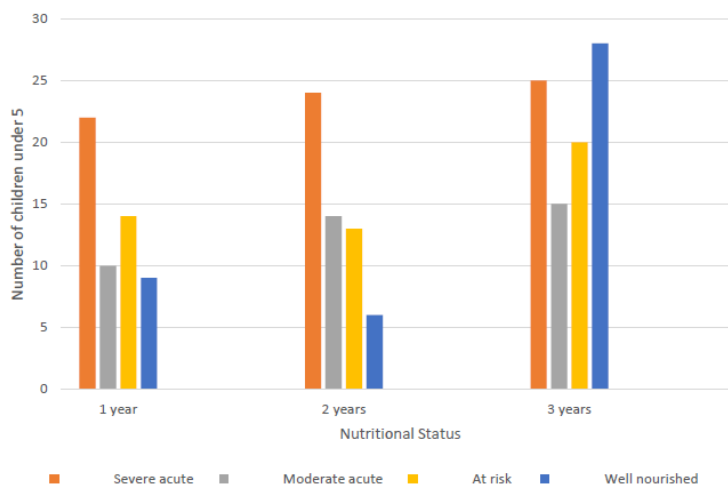


Figure 2: Nutritional status using Age-Mid upper arm circumference

The weight for height z-score on Table 3 showed that about 0.5% of boys were severely wasted, while there was no record of severe wasting among the girls, 2.0% of the boys were wasted while 0.5% of girls were wasted.

Table 3: Weight for Height for CU5

Gender		WHZ score						
		3	2	1	0	-1	-2	-3
Male	Count	2	6	56	20	4	4	1
	%	1.0%	3.0%	28.0%	10.0%	2.0%	2.0%	0.5%
Female	Count	4	3	60	34	5	1	0
	%	2.0%	1.5%	30.0%	17.0%	2.5%	0.5%	0.0%
Total	Count	6	9	116	54	9	5	1
	%	3.0%	4.5%	58.0%	27.0%	4.5%	2.5%	0.5%

Weight for Age of children under 5 years showed that about 0.5% of boys were underweight while 3.0% were underweight among the girls, 7.0% were mildly underweight for boys while 5.5% were mildly underweight for girls, 13.5% of boys were slightly overweight while 15.5% of girls were mildly overweight. About 9.5% of boys were underweight and 10% of girls were underweight with 2% and 1.5% being severely underweight for boys and girls respectively. 18% of boys were underweight (13.5% mild, 4% moderate and .5% severe) and 17.5% of girls were underweight (15.5% mild and 2% moderate).

Table 4: Weight for Age for CU5

Gender		WAZscore						
		3	2	1	0	-1	-2	-3
Male	Count	1	8	27	38	14	1	4
	% of Total	0.5%	4.0%	13.5%	19.0%	7.0%	0.5%	2.0%

Female	Count	0	4	31	52	11	6	3
	% of Total	0.0%	2.0%	15.5%	26.0%	5.5%	3.0%	1.5%
Total	Count	1	12	58	90	25	7	7
	% of Total	0.5%	6.0%	29.0%	45.0%	12.5%	3.5%	3.5%

Height for Age of CU5 showed that about 3.5% of boys and 17% of girls were slightly stunted, 9% of both boys and girls were mildly stunted while 4% of boys and 6% of girls were severely stunted.

Table 5: Height for Age

Gender		HAZ score						
		3	2	1	0	-1	-2	-3
Male	Count	1	11	8	40	7	18	8
	% of Total	.5%	5.5%	4%	20%	3.5%	9%	4%
Female	Count	2	4	8	29	34	18	12
	% of Total	1%	2%	4%	14.5%	17%	9%	6%
Total	Count	3	15	16	69	41	36	20
	% of Total	1.5%	7.5%	8%	34.5%	20.5%	18%	10%

The stunting level (48.5%) among CU5 in Shomolu local government area is above cut off point from the significant level of public health, thus suggesting immediate attention of all the concerned bodies such as public health authorities. The result from the 2013 Nigeria Demographic and Health Survey (NDHS) revealed that 37% of CU5 were stunted, while 21% were severely stunted, 18% of under-five children in Nigeria were considered wasted and 9% were severely wasted while 29% were underweight, with 12% being severely underweight. The prevalence of stunting in the present study is higher than that of NDHS 2013. NDHS (2018) also showed that about 37% of Nigerian CU5 were stunted, 7% were wasted, 22% are underweight, and 2% are overweight. This implies that the COVID 19 lockdown increased stunting among CU5. This is likely to be due to income reduction that affected food accessibility and affordability. Though the rate of stunting reported by NDHS (2013) and NDHS (2018) is somewhat lower than that of this study, all the reports still follow a similar trend.

Table 6: Nutritional Status of CU5 and Lockdown

Income and ability to purchase all food items needed in the house during lockdown	Mid upper arm circumference					Total (%)
	SAM	MAM	ARM	WN		
Yes	23 (11.5%)	9 (4.5%)	22 (11.0%)	30 (15.0%)	84 (42.0)	
No	48 (24.0)	30 (15%)	25 (12.5)	13 (6.5)	116 (58.5)	
Total	71 (35.5)	39 (19.5)	47 (23.5)	43 (21.5)	200 (100.0)	

Note: $\chi^2 = 22.478$; $df = 3$ $p = 0.000$

The relationship between the lockdown and nutritional security and status of children under 5 shows that about 4.5% toddlers who suffer from moderate acute malnutrition (MAM) are from families that did not have enough money to purchase all the food items needed in the family during the lockdown while 15.0% CU5 that were well nourished (WN) are from families who had enough money to purchase food items during the pandemic. The result also reveals that about 24% of the children who suffer from severe acute malnutrition (SAM) are from families who did not have enough cash to purchase food items during the lockdown while 15.0% who suffer from

moderate acute malnutrition (MAM) are from families who did not have enough money to purchase food items. This finding agrees with that of Salois et al., (2012) who observed that income is a key determinant of nutritional status.

Conclusion

The COVID-19 pandemic had a huge influence on the nutritional security and status of children under five in Shomolu LGA. The study found a significant relationship between mothers' socio-demographic characteristics and nutritional security and status of their CU5. The effect of the lockdown was seen in the decline in employment of parents, the number of children that suffered acute malnutrition. In view of this, it is recommended that mothers should be given nutrition education on good feeding practices, also government and non-governmental organizations (NGOs) are advised to intervene in the provision of food for CU5, particularly during emergencies and also provide an environment for self and economic empowerment that can reduce the vulnerabilities of children and caregivers to poor nutrition.

References

- Arndt, C., Davies, R., Gabriel, S., Harris, L., Makrelov, K., Robinson, S., Levy, S., Simbanegavi, W., Seventer, D. Van, Anderson, L., van Seventer, D., & Anderson, L. (2020). COVID-19 lockdowns, income distribution, and food security : An analysis for South Africa. *Global Food Security*, 26, 100410.
- Barrett, C. 2020. Actions now can curb food systems fallout from COVID-19. *Nature Food*. 1: 319-320
- Crawley J. Reducing the burden of anemia in infants and young children in malaria-endemic countries of Africa: From evidence to action. *Am J Trop Med Hyg*. 2004; 71(2):25-34.
- FAO, IFAD, UNICEF, WFP and WHO. 2021. *The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all*. Rome, FAO.
- Federal Ministry of Health. 2020. *Nigeria food and nutrition response plan for COVID-19 pandemic*.
- Jesmin A, Yamamoto SS, Malik AA, Haque MA. Prevalence and determinants of chronic malnutrition among preschool children: a cross sectional study in Dhaka City, Bangladesh. *J Health Popul Nutr*. 2011; 29(5):494-9.
- Keikhaei, B., Zandian, K., Ghasemi, A. & Tabibi, R. 2007. Iron-deficiency anemia among children in southwest Iran. *Food Nutr Bull*. 28 (4):406-11.
- National Population Commission (NPC) (Nigeria) and ICF. 2019. *Nigeria Demographic and Health Survey 2018*. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.
- National Population Commission (NPC) (Nigeria) and ICF. 2014. *Nigeria Demographic and Health Survey 2013*. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.
- Nicodemas, D., Fweja, L.W.T & Magoha, S.H. (2019) Association between feeding patterns and nutritional status of the under five children (6-59 months) in Mtwara Rural District, Tanzania. *Journal of Food, Nutrition and Agriculture* 2(1) 20=26
- Onifade, O. M. Okorie, K. J. and Otegbayo, J. A. 2019. Nutritional status and eating patterns of preschool children in a community in south-west Nigeria. *Nigerian Journal of Nutritional Sciences (ISSN 0189-0913)*. Vol. 40 No. 2.
- Osei A, Pandey P, Spiro D, Nielson J, Shrestha R, Talukder Z, Quinn, V. & Haselow, N. 2010. Household food insecurity and nutritional status of children aged 6 to 23 months in Kailali District of Nepal. *Food Nutr Bull*. Vol 31(4):483-94.
- Salois, M. J., Tiffin, R. and Balcombe, K. G. (2012) Impact of income on nutrient intakes: implications for undernourishment and obesity. *Journal of Development Studies*, 48 (12). pp. 1716-1730. ISSN 1743-9140
- Samuel, F.O., Eyinla, T.E., Oluwaseun, A., Leshi, O.O., Brai, B.I.C. and Afolabi, W.A.O. 2021. Food Access and Experience of Food Insecurity in Nigerian Households during the COVID-19 Lockdown. *Food and Nutrition Sciences*, 12, 1062-1072
- Terazono, E. & Munshi, N. 2020. Choc waves: how coronavirus shook the cocoa market. *Financial Times*, July 30.
- Torero, Maximo. 2020. Prepare food systems for a long-haul fight against COVID-19. In *COVID-19 and global food security*, eds. Johan Swinnen and John McDermott. Part Seven: Preparing food systems for future pandemics, Chapter 27, Pp. 118-121. Washington, DC: International Food Policy Research Institute (IFPRI).
- UNICEF 2019. *The State of the World's Children 2019*. Children, Food and Nutrition: Growing well in a changing world. UNICEF, New York.
- United Nations Children's Fund. 2009. *The State of the World's Children Special Edition: Celebrating 20 Years of the Convention of the Rights of the Child*. New York: United Nations Children's Fund.

United Nations System Standing Committee on Nutrition. *6th Report on the World Nutrition Situation: Progress in Nutrition*. 2010. Geneva, Switzerland: United Nations Standing Committee on Nutrition

United Nations. 2012. *The Millennium Development Goals* report.

Weingartner L. 2013. Paper I: The concept of food and nutrition security. In: Klennert K, ed. *Achieving food and nutrition security: Actions to meet the global challenge: A training course reader*. German Society for International Cooperation

United Nations Children's Fund, World Health Organization, and the World Bank. 2012. *UNICEF-WHO-World Bank joint child malnutrition estimates: Levels & trends in child malnutrition*.