

# Post-Pandemic Era: Approaches to Cushion the Impacts of COVID-19 on Food Security

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## ABSTRACT

The COVID-19 pandemic and its continuous spread have influenced agricultural food production, thus challenging food security across the world. The current pandemic has contributed negatively to food supply and demand and this has increased the problem of food insecurity in the world. In Nigeria for instance, the COVID-19 preventive measures affected the harvest of farm produce and their transportation, as well as the availability of laborers to harvest farm produce. This eventually resulted in a huge loss and supply to the market and further led to a hike in the cost of food commodities, hunger, disease outbreaks and protests. Employing preventive measures at different levels to cushion the impacts of the COVID-19 pandemic can help assure crop productivity and a safe ecosystem. Also, the government should swiftly make plans to sustainably improve food production and availability to meet the needs of the people. Nevertheless, a critical overview of understanding the impacts of COVID-19 on food security and cushioning strategies in the post-pandemic era remains profound. Therefore, this study provides information on the impacts of COVID-19 on food security, as it pertains to farming, farmers, food demands and possible post-COVID-19 coping strategies.

## KEYWORDS

Agriculture, disease outbreak, farm produce, food security, lockdown

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## INTRODUCTION

Food insecurity is a stern challenge owing to the growing human population<sup>1,2</sup> and has further been exacerbated by the current COVID-19 pandemic, which has disturbed different aspects of human endeavors. The pandemic has particularly contributed negatively to food supply and demand and this has increased the problem of food insecurity in the world. Consequently, in a very recent time, many studies have been conducted to verify and evaluate the impacts of the COVID-19 pandemic on agriculture<sup>3-5</sup>, food security<sup>6,7</sup>, grains and oilseeds sector<sup>8</sup>, agricultural trade<sup>9</sup>, fruit and vegetable markets<sup>10</sup>, dairy and poultry



sectors<sup>11</sup>, food security in the near East and North Africa<sup>12</sup>, agriculture, food security and animal sectors<sup>13</sup>, consumer food demand responses<sup>14</sup>. However, there is still a considerable research gap in studies examining the impact of COVID-19 on food security.

The economic crisis predicted by the World Bank<sup>15</sup> and Picchioni *et al.*<sup>16</sup> due to the COVID-19 pandemic will minimize access to food supply and cause hunger among the down-trodden (i.e. the poor), as well as undermine the quality of diets. Picchioni *et al.*<sup>16</sup> forecasted a global shift from high-quality food items towards less nutritious food items. Also, a reduction in the supply of fresh food items will be experienced due to interferences in food distribution systems<sup>17</sup>.

To curtail COVID-19, a couple of preventive measures have been implemented and these include quarantining suspected persons, as well as imposing lockdowns in which human and vehicular movements are restricted. These preventive strategies are overly challenging<sup>18</sup> and have inflicted pain on people, especially in the area of food acquisition. Some low-income nations even imposed a momentary state of emergency upon confirming the first COVID-19 case. Importation and exportation of products, including agricultural products, are declining and even terminated as the case may be. Nations have to rely on emergency palliatives, which may not be sufficient to relieve their citizens, particularly the vulnerable ones. In some nations, transportation is not fully operational due to the existing lockdown and this has affected the supply of goods and services, especially food items<sup>19</sup>.

Although, these preventive tactics have been implemented at different levels, their impacts in cushioning the COVID-19 pandemic have been tremendously productive. However, a detailed examination of the impacts of the pandemic on food security is absent. On this ground, this study discussed food security and, the impacts of COVID-19 on food security, as it pertains to farming, farmers and food demands. This study also highlighted possible post-COVID-19 coping strategies.

### **FOOD SECURITY: ITS EVOLUTION, DIMENSIONS AND CONNECTION WITH DEVELOPMENT**

Food is necessary for everyone and this need must be met for optimum and healthy living. A major drawback in the world at this time is how to make available enough food to the over seven billion humans residing all over the world. Population increase has been highlighted by the FAO as a key factor that determines food security<sup>20,21</sup>. It is thus not new that with the noticed geometric growth in Nigeria's population, the nation is faced with an obvious crisis relating to the availability of food and access to it.

Although, Nigeria had been able to reduce undernourishment in its population by 50% (19.3-8.5% in 1990 and 2010-2012, respectively), between 2010 and 2016 the number of those who are undernourished rose from 10 million to around 14 million<sup>22</sup> and more complicated conditions have been observed in the conflict-exposed North-Eastern region of Nigeria. The per capita energy consumption over the last 20 years in Nigeria has dipped below the prescribed level<sup>23</sup>.

Reports from the Global Food Security Index revealed that Nigeria was placed 91 out of 109 nations and scored 37.1 out of 100<sup>24</sup>. As though not bad enough, the local farmers who make up a major chunk of the agricultural terrain and food supply chain of Nigeria, also experience constraints that disrupt their productivity<sup>25</sup>. Food availability is a multidimensional, many-sided phenomenon that is affected by culture and environment<sup>26</sup>, including population increase and pandemics, such as the present COVID-19 pandemic (Fig. 1)<sup>18</sup>.

The environment may positively or negatively affect agricultural food production e.g. arid environments may not support the production of some crops, the culture of a region can influence the quality of food

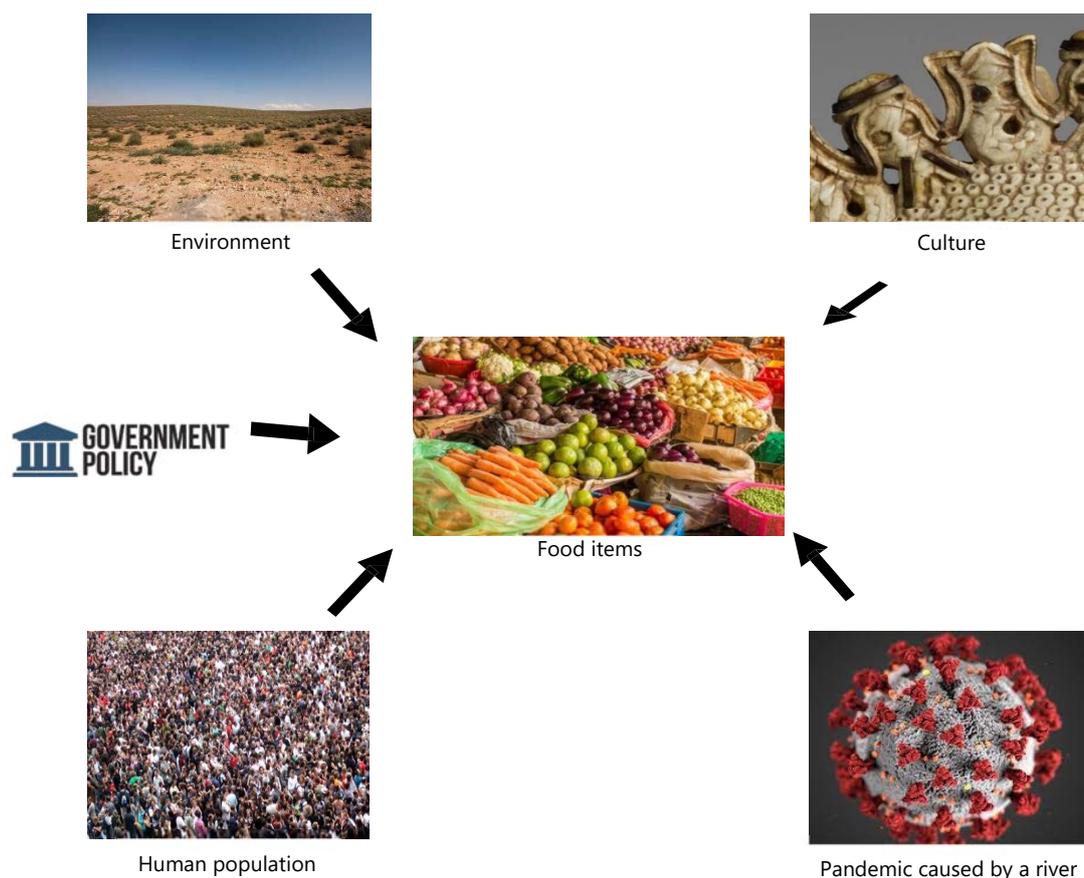


Fig. 1: Different factors that can impact food security

available to the people of that climate, government policy can either enhance or diminish food availability (e.g. government policy can influence prices of food items thereby affecting food accessibility and affordability), increasing human population results in competition for the available food items, while pandemic such as the current COVID-19 pandemic has negatively impacted food security in different ways (e.g. the lockdown and restriction in movement locally and internationally has adversely reduced food availability and quality in so many countries).

There are 5 separate criteria the FAO uses to define food security (global, individual, national, household and region). Food security based on these levels is thus defined as a situation when all humans every time, have economic and physical access to adequate, healthy and nutritious food to take care of their nutritional needs and food choices for healthy well-being<sup>27</sup>.

In September 2015, the UN at its general meeting accepted the decision of the agenda for lasting development and this resolution gave birth to seventeen goals now called Sustainable Development Goals (SDG). The Goal 2 of the SDG goals as a part of the food security targets was put in place to address the necessity of food security within the larger plan and asks member nations to stop hunger, meet food security targets enhance nutrition and support renewable agriculture by 2030. The second SDG has five main focuses and three proposed methods put in place to implement them<sup>28,29</sup>.

In 2019, it was observed that around 690 million humans, representing 8.9% of the world's population, were reported to be malnourished worldwide. This data shows that the number of hungry people has continued to go up since 2014 and is forecasted to rise to 841.4 million, representing 9.8%, of which Africa

will possess 433.2 million (51.5%) share, the largest number of malnourished people world over by 2030<sup>30</sup>. However, thinking seriously about the number of persons confronted with food problems around the globe, the Global Report on Food Crisis in 2020 recounted that around 135 million persons are suffering from serious food shortages in 55 nations and regions, while 73 million of the total figure come from 36 African countries<sup>31-33</sup>.

About 250 definitions and 450 pointers of food security exist<sup>34</sup>, however, the generally accepted description of food security is that propagated by the FAO which came into light after the World Food Summit held in 1996<sup>35</sup>. Breaking down the definition of food security exposes the many-sided nature of the concept of food security. Food security is concerned about the availability of food of inappropriate quality and quantity, economic and physical access is concerned about each person's access to enough food, the security part relates to the utilization of food by the human body, while food stability is concerned about the time-bound part of food availability, utilization and access<sup>36</sup>. These main variables have been generally acknowledged as the 4 key dimensions of food sufficiency (access, stability, utilization and availability of food)<sup>34,36-38</sup>.

**Evolution of food security:** The concept of food security is a key phenomenon with worldwide recognition. It was initially found to be a concept of food supply where at that period, the food crisis raised concerns that global food distribution shortages may lead to a political crisis. It was acknowledged then that the availability of food remained a major component of understanding the meaning of food security and it was discovered that food security was not enough condition for food access at the home level<sup>38</sup>.

Sen<sup>39</sup> reported that poor people usually lack the right to food because of the rise in the prices of food and lower demand for salaried labor. The concept of food security revolves around the availability and distribution of quality foods at the local and national levels; and also, among households and individuals<sup>36,40-43</sup>. Home as a major social unit provides knowledge about foods for human consumption with adequate nutritional quality<sup>36,43</sup>. In addition, food utilization distinguishes the rate at which food is been distributed within the home units, standard measures at the national level and changes in the utilization and disintegration of food nutrients by individuals within the home unit.

The food security description was improved at the World Food Summit held in 1996. The improved definition spells out the necessity of diet quality not only at individual levels but also at household levels<sup>35</sup>. The food security explanation proposed by the Dlamini<sup>35</sup> afterward became the famous definition that combined not only the three fields of food security explained earlier (utilization, availability and access), but added the expression "at all times" which stressed the fourth, less popularly accepted field of food security, that is, the firmness of food sufficiency over a long time<sup>38,44</sup>.

**Four main dimensions of food security can be identified:** Enhanced food security is hinged around four key fundamental dimensions which include food availability, access to food economically and physically, utilization of food and food stability.

Food availability means that food should be available for use through enhanced crop production, access to the market and constant spreading to all. The availability of food speaks of the "supply aspect" of food security which is determined by food production and stock level, net trade. Cultivating more food to accomplish food security connotes that biological and economic difficulties facing the food structures have to be overcome. With access to food, homes will be able to obtain food by possessing sufficient financial strength to buy it. This will require effort to be put in to make food affordable through regulated pricing or improving the purchasing power of households sustainably. This can be achieved by releasing drought-tolerant varieties<sup>1</sup>, thus reducing the possibility of crop failure.

Sufficient provision of food at the international or national level may not in itself assure household food sufficiency. Worries about inadequate food access have led to an increased policy focus on wages, spending, prices and markets in attaining food sufficiency goals. Food utilization is concerned with the right selection and arrangement of food which allows the body to efficiently use the food it eats. Utilization is generally understood as to how the body utilizes the most of different nutrients present in the food. Adequate nutrient and energy consumption by people is the result of hygienic feeding practices, preparation of food, varieties of the diet and distribution of food within the household. In addition, to good biological use of food eaten, decides the status of people nutritionally. The measure of food stability connects to the regularity of food access and availability to individuals, which is seen in the production and prices of food in a specific geographical region.

Food availability inconsistency is seen in the dynamics of food sufficiency among homes with unchangeable effects like stunting as a sign of malnutrition over a long time; nutrient and caloric defect and also loss of weight in months and nutrition shocks in weeks<sup>45</sup>.

Even though a person's food consumption is enough today, the person is still seen to be threatened by food insecurity if the individual has an insufficient supply of food regularly, putting the individual's nutritional status at risk. Unfavorable weather conditions, economic forces, or political unrest may also have an impact on an individual's food security position. To realize food security targets, all four areas must be simultaneously fulfilled.

Conversely, food insufficiency is the absence of any of these components. Food insecurity can be disaggregated into transitory and chronic. Food insecurity that occurs seasonally can be found between the two<sup>38,46</sup>. Food insecurity is described as chronic when people have difficulties in meeting their lowest food requirement over a long, sustained period<sup>44,47,48</sup>. Chronic food insecurity results from long periods of poverty, absence of assets and insufficient access to money.

Intermediate food insufficiency is usually temporary or short-term and it entails short seasons of a serious scarcity of available food and access to sufficient food to maintain optimum nutritional status<sup>44,47,48</sup>. This type of food insecurity is caused by temporary shocks and variations in the availability of food and access to food, including the annual changes in domestic food production, household income and prices of food. Intermediate food insufficiency is somewhat uncertain and can emerge abruptly. This creates difficulty in programming and planning and demands different functions and types of interference, including quick warning function.

These programmes include:

- **Focused feeding programmes:** Which include meals for school children, provision of food for pregnant and breastfeeding mothers and also children under five via local health providers, special canteens and soup kitchens
- **Work and get food programmes:** Work types that offer food in return provide help to households while building helpful structures like local irrigation and roads, structures for community hospitals and schools
- **Fund-transfer programmes:** These can be accomplished by currency notes or gift items, including stamps for food, funded rations and focused strategies for low-income homes

The idea of periodical food security is between transitory and chronic food insufficiency. It resembles chronic food insufficiency as it is forecasted and follows a series of known events. However, as periodical food insufficiency is for a short time, it can also be observed as persistent, passing food insecurity. It

happens when a circular pattern of insufficient availability and food access. This is linked with periodical inconsistency in the weather, planting patterns, job opportunities and disease outbreaks<sup>49</sup>.

**Food security and national development:** An increase in per capita wages can bring about economic growth and national development, with the prospects of ensuring food security and healthy living standards for people, sustainably. Economic growth can be attributed to competence and creativity with continuous industrial investment. Agricultural development remains the bedrock for sustainable economic growth in the countries of the world and this can be linked to the use of modern strategies in enhancing crop and animal productivity, thus serving as a source of raw materials for industries and for export purposes<sup>33</sup>.

Food insufficiency and its by-products are utilized as economic growth signs because of the explicit linear correlation that is found between the two<sup>28</sup>; this accounts for its conspicuous mention in the sustainable development goals.

**Examples of food insufficiency-related signs include:**

- Popularity of stunting and mismanagement of young children
- The mortality rate of children below five years of age
- Mortality rate of infants
- Mortality rates of mothers
- Ratio of the complete water resources utilized

For Nigeria to improve, food security development must be maintained. A rise in production processes in the manufacturing sub-sector, especially if it supports export must assuredly put a meal on the table of an ordinary Nigerian. No nation can survive sustainably without enhancing the human resource section of the economy<sup>33,50,51</sup>. Food insufficiency adversely affects human, emotional and social development all through life's course and is a key social and societal disruptor with grave drawbacks for planetary health.

Food security is connected to every one of the UN-SDGs. Enhanced food sufficiency control based on sustainable agricultural practices is key for nations to meet the SDGs<sup>52</sup>.

Food and nutrition sufficiency embraces satisfying the protein, energy and nutritional requirements for a healthy life. Agricultural and food systems overlap in the areas of food manufacturing and also incorporate the different sets of institutions, practices and technologies that control the way food is produced, sold, consumed, transported and accessed<sup>53</sup>.

**Effects of COVID-19 on farming and farmers:** Agriculture for food production remains the bedrock of other sectors that support human living and has provided several economic opportunities to both developed and developing countries<sup>54</sup>. The focal points of SDGs are to ensure zero hunger, economic growth, stable health benefits and food security for human livelihood, especially in Sub-Saharan Africa where there is a high disparity between rich and poor<sup>55,56</sup>. In Nigeria, two clear climatic conditions, rainy and dry seasons favorable to agricultural production are known. Maximization of the natural water supply has contributed to farming in rural communities that cannot afford the cost of irrigation systems. In the last decade, studies have shown accounts for 60% of the food supply from West African countries to other countries in the Sub-Saharan regions<sup>57</sup>. Despite this, agricultural production in this area is faced with climate change, soil degradation and the COVID-19 pandemic, thus envisaging future threats to farming.

Unlike in the developed countries where mechanized farming is practiced, more than 65% of farmers in Africa who form a key player in farming activities are rural dwellers with small farm settings. Many are impoverished and vulnerable as a result of malnutrition challenges. For instance, in some developing countries like Nigeria where subsistence farming is the major agricultural practice employed based on an inadequate supply of mechanized tools, farming activities are achieved manually<sup>58</sup>. In the developed countries where mechanized farming is adopted for the production of staple foods, fewer impacts of COVID-19 were observed, unlike in the developing countries where agricultural food production requires more manpower, thus making them vulnerable to COVID-19<sup>18</sup>.

The global alarming COVID-19 pandemic has caused great havoc, limiting food supply to the world population due to poor turn-out of farm produce and engagement of agriculturists in food production<sup>59</sup>. The lockdown imposed to curtail the spread of COVID-19 set a barrier to hiring labor for food production. The COVID-19 regulation on the restriction of movement has worsened the situational lifestyle of about 1.5 billion people in Africa, mainly the set of unemployed people who are poorly dependent on daily menial jobs with lesser income. Many but not all governments in African countries took adequate measures to leverage the hardship posed by the COVID-19 lockdown to the vulnerable class. As such, the government is expected to supply food commodities to the less privileged and vulnerable households' especially in rural communities to meet their needs.

At times, the demand for manual labor at the peak of farming activity is usually high, but the restriction policy and lockdown scenario refrained people's freedom to access their farmlands<sup>60</sup>. Consequently, reducing the workforce participating in farming activities and the food production rate in many countries<sup>55</sup>. In Nigeria, because of favorable weather for planting during the first and second quarter of the year (i.e. March to July), farmers plant food crops such as millet, cucumber, maize, tomatoes and groundnut<sup>61</sup>. Also, because of their perishable nature and the harvesting period that occurred at the peak of the lockdown, as well as the shortfall in laborers to harvest farm produce resulted in a huge loss and reduced supply to the market. In the long run, this resulted in a hike in the cost of food commodities, hunger, disease outbreaks and protests<sup>55</sup>.

Movement restrictions, low income to farmers and inadequate supply of farm inputs (viable seeds, chemical fertilizer, farm labor and machinery) resulting from COVID-19 impacts have limited agricultural outputs. In Nigeria, absenteeism and closure of food preparation, processing and packaging units in some manufacturing industries, uncertain economic situations and high unemployment rates resulting from movement restrictions due to COVID-19 spread, adversely affect the market value of perishable food commodities<sup>62</sup>. More also, poor road networking cum restriction orders resulted in wastage of perishable foods. In China, the movement of perishable crops, such as vegetables along the food production chain was negatively affected due to COVID-19<sup>63</sup>. In another instance, many of the crops are grown depending on suitable planting time. The delay experienced in crop planting during this time due to the lockdown has affected crop yield and subsequent shortage of food supply to many households.

In recent times, the COVID-19 pandemic and its continuous spread have influenced agricultural food production, thus challenging food security across the world<sup>59</sup>. Like other viral pandemics that ravaged the world before now, COVID-19 has uncovered the need for active participation in agriculture as a stand-alone sector that interconnects with the economy, society and other sectors. The difference in agricultural practices from different countries of the world has caused different impacts of pandemic disruptive features, which are evident based on the disease symptoms<sup>64</sup>. Also, the 'social distance measure' to curtail the spread of the pandemic has affected the operating system of agricultural extension workers, especially in developing countries with poor infrastructure and a lack of extension services. Non-usage of farm machinery during the lockdown period can lead to malfunctioning of mechanical parts and access to machinery repair services might be a major problem.

The control measures put in place to reduce the spread of the COVID-19 pandemic have hindered the rate of crop production and transportation<sup>55</sup>. The disruptions in agricultural activities due to traveling bound imposed from country to country to curb the spread of coronavirus hampered food production for human livelihood. Over time, before the pandemic, efforts to ensure food supply have been threatened in diverse ways, such as low and inefficient farm input, inadequate capital, lack of land and pest and disease attacks. These have caused a huge loss in the annual crop yield and worsened threats to food scarcity and insecurity<sup>18</sup>. To cushion this effect, the multiplication of efforts in continents like Africa needs to be intensified. Moreover, the restriction of human and vehicular movement and the closure of airports at the peak of planting season in Nigeria affected farming activities and annual income<sup>59</sup>. Like in India, flowering farming was affected by the imposed lockdown that usually concurs with religious and marriage celebrations, a period in which the demand for flowers is high. Also, due to the counter-movement of laborers in India, the harvesting of Rabi crops during winter and the sowing of Kharif during summer were affected<sup>55</sup>. Furthermore, a lot of farmers lack access to farm inputs during the lockdown and this has negatively influenced the agricultural output. Hence, if not properly addressed, the COVID-19 pandemic may potentially and destructively influence food security in agriculture and farming in different countries.

**Food demands during COVID-19 pandemic:** Amidst the COVID-19 pandemic crisis, there is a limited food supply and high demand for food-restricted people in many homes to meet their daily nutritional requirements<sup>65</sup>. A fall in the consumer demand for foods as a result of a poor functional agricultural system has underlined critical issues arising from pandemic emergence. Boosting local food production makes easy accessibility to ensure maximum food supply to the vulnerable class. However, changes in the human attitude to food demand and consumption as observed during the pandemic were extremely different compared to the pre-COVID-19 era<sup>66</sup>. At the initial outbreak of this pandemic and when the risk associated was less understood, buying food was only based on mitigating the envisaged food shortage. A subsequent increase in the number of infected people globally also increases the demand for non-perishable food commodities such as rice, frozen foods, flour, rice, pasta and canned foods. An attempt to ensure food availability at home during the pandemic and high demand for foods have contributed to an increase in spending than expected in response to the crisis that may arise from food shortage<sup>67</sup>. Buying foods in large quantities could reduce visitation to stores, thus limiting human exposure to a large crowd who might be vulnerable to COVID-19<sup>68</sup>.

High demand for foods can lead to a change in dietary patterns and an increase in the price of consumer products<sup>69</sup>. Also, it may expose an individual to obesity risk, especially children as a result of a high rate of food consumption with decreased physical exercise or activity<sup>70</sup>. Nevertheless, attitudinal lifestyles resulting from the pandemic crisis could cause food scarcity and emotional imbalance due to poor feeding habits<sup>71</sup>. As documented by Wang *et al.*<sup>64</sup>, the psychological and emotional impacts of COVID-19 such as stress, depression and anxiety at the early stage have negatively led to eating foods high in sugars, fats and salt. It has been highlighted that dietary patterns and food consumption during the pandemic have resulted in the weight gain of many individuals<sup>69</sup>.

**Suggested coping tactics during the post-pandemic era:** The agricultural sector still maintains the means of the food supply chain and production system for human, economic growth and financial security across the globe<sup>72</sup>, however, varying limitations are confronting the agricultural production system which would require more commitment from the government, stakeholders and citizenry for it to thrive optimally and serve the purpose of major distribution of food supply chain formerly displaced by the outburst of global health crisis (COVID-19) pandemic<sup>73</sup>.

To upscale food production to ensure food security for all, the government and all supporting agencies could undertake some long and short-term goals to boost agriculture and the massive food supply chain<sup>74,75</sup>.

The government at all levels both federal and state as well as other supporting arms of government should support farmers with the needed palliatives such as an adequate supply of fertilizer at a reduced retailing price per 50 kg bag, provision of crop seedlings and arable farmland as well as farming implements at a highly subsidized cost<sup>76</sup> will enhance food security and good agricultural yields<sup>77</sup>.

In Nigeria, agriculture ranks among the largest contributors to Gross Domestic Product (GDP), but the budgetary allocations from both the federal and state governments are significantly low, receiving less than 2% in the past years, making it fall below the standard set by Maputo Declaration on Agriculture and Food Security over the years<sup>78</sup>. The Africa Union (AU) agreed to allocate not less than 10% of its member countries' annual budget to agriculture<sup>78</sup>. It is rewarding for the government to infuse sufficient funds into agriculture in other to build a healthier, sustainable, equitable and resilient food system to secure and promote the country's economics, diversity and growth which could also serve as a means of income (agribusiness) for small scale farmers<sup>79</sup>.

In Nigeria especially, different regions and states have core values of agricultural competence of specific farm products. When these regional agricultural heritages are adequately harnessed, it will promote comparative competitiveness in the agricultural sector while securing food and nutrition in the region and country, respectively<sup>80-82</sup>.

Kebbi State for instance has invested maximally in the production of rice and has been known as one of the largest rice-producing states in Nigeria<sup>83</sup>. Nevertheless, state governments and the Federal Capital Territory (FCT) are expected to intensively study the agricultural sector and food production to know how best they could add value to the agrifood sector<sup>79</sup>. However, the government could best support agricultural production through indirect farming, that is, by creating a conducive and secure environment in their states and regions for private individuals and industries to advance in farming activities<sup>81</sup>, rather than directly involved in food production. Such enabling conditions could involve making appreciable agricultural policy by the provision of adequate facilities for irrigation systems of farming, adequate food storage facilities for perishable farm produce as well as the creation of networks of good roads inter-connecting farming locations and commercially approved markets<sup>84</sup>.

The reintroduction of a geographical farming system based on the types of crops best grown at each region to be funded via public-private partnerships (PPP) would undoubtedly improve crop production in the country<sup>85</sup>. In Nigeria, 80% and above farmers are smallholder farmers (SHFs) which turn out more than 90% of the country's agrifoods. When these farmers are organized or grouped into clustering farming, there is a possibility that the country's economy could be stimulated through the integration of end-to-end farmers, suppliers and dealers of agribusiness and food manufacturing and processing companies<sup>86</sup>. The provision of efficient and affordable farm implements as well as improved seedling, storage and distribution systems will aid in high productivity among cluster farming<sup>80</sup>, which has been practiced by nations such as Brazil and Argentina.

Research and Development (R&D) plays an enormous role in improving agricultural yields hence ensuring food security in the country<sup>87</sup>. Research and Development (R&D) in Nigeria have been grossly underfunded in the past years. When proper research is been carried out in areas of agriculture, it could significantly improve food production in crops and livestock and could increase national and cross-national boundaries completion of agricultural produce<sup>88</sup>.

## **CONCLUSION**

Humanity and agriculture are adversely affected by the COVID-19 pandemic as reported in this present study. The steps towards accomplishing SDGs will additionally be threatened since the restriction measures imposed by many countries would likely aggravate the food crisis, particularly for developing

countries. Food availability and food prices are also impacted even on a global scale by the COVID-19 pandemic and therefore, the government should swiftly make plans to sustainably improve food production and availability to meet the needs of the people.

### **SIGNIFICANCE STATEMENT**

The COVID-19 pandemic poses health risks to humans and this has become an emerging issue for international communities and health professionals. To curtail the spread, many countries imposed lockdowns to prevent human and vehicular movements, which adversely reduced accessibility and availability of quality foods to humans in many countries, thereby causing biological and economic difficulties. To further strengthen long-term food security and national development in the post-pandemic era, upscaling food production and support from government and agencies for the easy supply of food to both local and international communities have been identified as strategic steps towards accomplishing SDGs. Hence, this review focused on the impacts of COVID-19 on food security and strategies in the post-pandemic era.

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