

COVID-19 AND FOOD SYSTEM, SECURITY AND SAFETY IN RURAL AREAS OF SOUTH-EAST NIGERIA: IMPACTS AND POSSIBLE COPING STRATEGIES

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Abstract

Farmers in rural areas are the hub of food system in South-East Nigeria. Unfortunately, the phobia of COVID-19 and its abrupt quarantine measures enforced through government agencies to an extent affected routine food system activities such as food production, distribution, consumption among others in rural areas of South-East Nigeria. Consequently, there is a serious threat to food security and safety which are dependent on sustainable food system. Therefore, the study sought to identify specific impacts of COVID-19 on food system, security and safety and possible coping strategies in rural areas of South-East Nigeria. The study was guided by 5 specific objectives. Exploratory sequential mixed method approach was adopted for the study. The sample size of the study was 150 commercial rural farmers purposely selected from each of the 5 states in South-East Nigeria. A semi-structured interview guide and researcher-adapted structured questionnaire were respectively used to elicit qualitative and quantitative data from respondents by researchers with the help of 3 trained research assistants. The permissions of respondents were sought before data collection; therefore data collection was entirely on voluntary basis. Researchers also ensured that the issues of privacy and confidentiality of respondents were respected. Also, strict adherence to COVID-19 rules during contacts with respondents was maintained. Quantitative data collected using a structured questionnaire were analyzed using descriptive statistics such as mean and standard deviations, and qualitative data from interview meetings were coded and analyzed to support the findings of the questionnaire. SPSS-software version-22 was used for the data analysis by researchers. The study identified 15 specific impacts of COVID-19 on food production, 10 specific impacts of COVID-19 on food distribution, 4 specific impacts of

COVID-19 on food security, 3 specific impacts of COVID-19 on food safety and 14 possible coping strategies to the Impacts of COVID-19 on food system, food Security and food Safety in rural areas of South-East Nigeria. Therefore, the study among others recommended that government, international organizations, philanthropists and banks should provide farmers with loans, subsidies, grants (funds, seeds, seedlings, agrochemicals and other relevant inputs) in order to boost food production in South-East Nigeria.

Keywords: *Coping Strategies, COVID-19 Impacts, Food System, Food Production, Food Distribution, Food Security, Food Safety*

Background to the Study

Food system is a complex mix of activities within an area which include food production, harvesting, processing, consumption, marketing among others (Lamuka, 2014). It is the major backbone of South East Nigerian economy in ensuring people's well being, providing raw materials, food, and employment for over 75% of the rural population. Therefore, effective food system within an area is essential for actualizing Sustainable Development Goals (SDGs) such as food security, food safety, poverty alleviation, and conservation of natural resources (Ibeawuchi, 2007). According to Capone *et. al.* (2014), food security in an area is evaluated under four basic pillars such as availability, access, utilization and stability of food. Therefore, a sustainable food system supports food security and provides consumers with nutritionally adequate, safe, healthy and affordable food for present and future generations. Notably, farmers in rural areas of South-East Nigeria are critical to food system. They perform various food system activities such as producing crops and animals, harvesting, handling/processing food, storage, marketing among others (Fasoyiro & Taiwo, 2012; Ibeawuchi, 2007). In South-East Nigeria, farmers in rural areas are the hub of the food system. Fawole & Oladele (2007) supported this by stating that about 70% of the rural areas are sustaining Nigerian agricultural production. Unfortunately, food system activities in rural areas of South-East Nigeria were greatly affected by the pandemic which was said to have emanated from China in 2019.

The novel pandemic called Corona Virus Disease-19 (COVID-19) is a contagious disease caused by a newly discovered corona virus which rapidly spreads through contact (WHO, 2020). The first case of this disease in sub-Saharan Africa was recorded in Nigeria in February, 2020 (NCDC, 2020, BBC, 2020). In order to contain the virus, the Federal Government of Nigeria declared a total lockdown of

economic activities and enforced serious quarantine policies throughout the nation which restricted the movement of individuals living in rural and urban areas of Nigeria (Daily Trust, 2020). The COVID-19 which quickly gained its access through the borders of Nigeria eventually spread to the South-East Nigerian states (Abia, Anambra, Ebonyi, Enugu and Imo) and eventually disrupted many economic activities including the food system, thus posing a serious threat to food security, food safety and actualization of other SDGs (Iwelumo *et al.*, 2020, Terero, 2020). This abrupt disruption of food system by COVID-19 has increased the level of hunger and food insecurity within South-East Nigeria. According to FAO (2019), hunger is a condition where people are unable to meet their food requirements, consume enough calories to lead a normal, active life over a protracted time. Notably, this condition has long-term implications for people's future, and continues to present a hindrance to global efforts to reach Zero Hunger. The occurrence of hunger within a particular locality is an indication of food insecurity. Food insecurity could be acute or chronic. Acute food insecurity means that individuals have limited access to food in the short-term due to sudden crises that may put their lives and livelihoods at risk. However, if these individuals get the assistance they need during this condition, the situation will not become chronic (FAO (2019)). More so, as a result of the incidence of COVID-19, food safety is not fully guaranteed to individuals living in South-East Nigeria and beyond. According to Australian Institute of Food Safety (2019), food Safety refers to handling, preparing and storing food in a way to best reduce the risk of individuals becoming sick from foodborne illnesses. Researchers observed that many farmers and individuals in South-East Nigeria seem not to be handling, preparing and storing foods in the best way to prevent infection. Food is one of the risk factors to contacting COVID-19 (FAO 2019), thus the disease seem to have impacts on food safely.

Food security and safety of an area depend on the sustainability of the food system, however the social dimension of the sustainability concerns the social conditions of farmers and people affected by the food system (Thomas, 2014). The prevailing social and economic conditions of rural farmers and other individuals being affected by food system in South-East Nigeria, especially during active enforcement of isolation measures, are not convenient for a sustainable food production system. Therefore, to ensure that the food system is not further distorted by COVID-19 in rural areas of South-East Nigeria, Iwulemo *et al.* (2020) recommended that government should provide more palliatives to farmers in the form of improved seedlings, basic farm implements at highly subsidized prices,

and free or more affordable farm extension services. More so, the agricultural sector should be accorded more budgetary allocations. FAO (2019) suggested food system transformation, reinforcement of global humanitarian responses, boosting smallholder resilience for recovery, bolstering trade and food safety standards, economic inclusion and social protection to reduce poverty, improve data for decision making and preventing the next zoonotic pandemic through strengthened one health approach. Shrikrushna *et al.* (2020) recommended the adoption of adaptive strategies and policy responses to food trade, postharvest food processing, food cost, food safety, stabilizing individuals' incomes and access to food, and ensuring continuities of food supply chain.

Researchers observed that the phobia of COVID-19 and its abrupt quarantine measures enforced through government agencies to an extent affected routine food system activities such as food production, distribution, consumption among others in rural areas of South-East Nigeria. This eventually led to a noticeable decrease in general food production, supply, global food exchange, massive decrease in demand for commercial food services, restrictions in farm labour operations, processing capacity and storage. Thus farmers discarded some of their output in large quantities, thus increasing prices of food and related items, rate of hunger and food insecurity (Emma *et al.*, 2020; Iwelumo *et al.*, 2020; Terero, 2020; FAO, 2019). Observably, the governments of South-East Nigerian states have adopted many emergency policies and palliative measures to improving food production, distribution, security and safety, yet many rural farm households are suffering from serious economic hardships which seriously affect the food system. Currently, there is increasing cases of hunger in South-East Nigeria as a result of the impacts of the pandemic. FAO (2019) noted that COVID-19 struck at a time when poverty and hunger keeps rising, especially in developing countries. More so, according to the recent UN statistics, at least, an additional 83 million individuals, and possibly as many as 132 million, may go hungry in 2020 as a result of the economic recession triggered by the pandemic. FAO noted that unless immediate actions are adopted by governments, humanitarian agencies and philanthropists to boosting food production system amidst the pandemic, we risk a global food emergency that could have long-term impacts on hundreds of millions of children and adults (FAO, 2019). Therefore, there is need to adopt realistic coping strategies to boost the food production system in order to curtail the impacts of COVID-19 (CGIAR, 2020). This issue can be adequately addressed through research. Shrikrushna *et al.* (2020) advised for more research efforts in examining the impact of COVID-19 on foods systems. Hence, this study sought to

identify specific impacts of COVID-19 on food production system in rural areas of South-East Nigeria and possible coping strategies. The findings of this study would provide empirical information for governments, local and international humanitarian agencies and philanthropists on specific impacts of COVID-19 on rural food system and the possible coping strategies. Consequently, it would spur them to enacting and implementing realistic policies to curtailing the impacts of COVID-19 on food production, food distribution, food security and food safety in South-East Nigeria.

Specific Objectives

This study specifically sought to identify;

- impacts of COVID-19 on food production;
- impacts of COVID-19 on food distribution;
- impacts of COVID-19 on food security;
- impacts of COVID-19 on food safety, and
- coping strategies to impacts of COVID-19 on food system, security and safety in rural areas of South-East Nigeria

Research Questions

The following research questions were raised in line with specific objectives and answered by the study.

- What are the impacts of COVID-19 on food production?
- What are the impacts of COVID-19 on food distribution?
- What are the impacts of COVID-19 on food security?
- What are the impacts of COVID-19 on food safety? and
- What are the possible coping strategies to the impacts of COVID-19 on food system, food security and food safety?

Methodology

Area of Study and Research Design

The area of the study is rural areas of South-East Nigeria. South-East is one of the six geopolitical zones of Nigeria made up of 5 member states. The 5 states that make up South-East Nigeria include: Abia, Anambra, Ebonyi, Enugu and Imo. The study adopted an exploratory sequential mixed method. This type of mixed

method approach has two phases (Morteza & Sirous, 2015). In the first phase, researchers collected qualitative data from a limited number of samples in order to explore a condition. In the next phase, researchers collected quantitative data randomly from a relatively large population in order to explain relationships found in the qualitative data (Creswell 2012).

Sampling/Techniques

The study purposively selected 15 rural commercial farmers from each of the 5 states in South-East Nigeria (Abia, Anambra, Ebonyi, Enugu and Imo), culminating to a total sample size of 150 rural farmers used for the study.

Ethical Consideration, Instrument and Data Collection

Data were collected from respondents for this study with ethical considerations. The permissions of respondents were sought before data collection; therefore data collection was entirely on voluntary basis. Researchers also ensured that the issues of privacy and confidentiality of respondents were respected. Also, strict adherence to COVID-19 rules during interview meetings was maintained. At the first phase of qualitative data collection, researchers administered a semi-structured interview guide to 5 rural commercial farmers from each of the states in South-East Nigeria (25 rural farmers in South-East Nigeria). The semi-structure interview questions were based on the research questions posed by the study. Data gathered during interview meetings with the 25 respondents were recorded using electronic recorders. Secondly, 125 researcher-developed structured questionnaires validated by 3 experts in the field of Agricultural Education were administered to respondents by researchers with the help of 3 trained research assistants. The questionnaire was structured on 4-point scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with respective values of 4, 3, 2 and 1.

Method of Data Analysis

Quantitative data collected using a structured questionnaire were analyzed using descriptive statistics such mean and standard deviations, and data from interview meetings were analyzed qualitatively to support the findings of the questionnaire. Decision rules on questionnaire items were based on the following; mean scores ≥ 2.5 average on 4-point scale were described as "Agreed" while mean scores < 2.5 average on 4-point scale were described as "Disagreed". Researchers used SPSS –software, version 22 for data analysis.

Results

Quantitative and qualitative results of the study on each of the research questions are presented below

Research question 1: What are the impacts of COVID-19 on food production in Rural Areas of South-East Nigeria?

COVID-19 and Food Production

Quantitative and qualitative data for answering research question 1 are presented below

Table 1: *Impacts of COVID-19 on Food Production in Rural Areas of South-East Nigeria*

S/N	Item statements	\bar{X}	S	Decision
1	Decrease in the supply of agricultural inputs	3.29	.787	A
2	Scarcity of farm labour	3.27	.592	A
3	Restriction in mobility of farm labour	3.19	.785	A
4	Increase in the cost of food production	3.41	.700	A
5	Increase in the cost of agricultural inputs	3.26	.777	A
6	Decrease in the level of food production activities	3.13	.727	A
7	Increase in the cost of farm labour	3.33	.744	A
8	Exposure of farm labour to the risk of COVID-19	3.30	.735	A
9	Decrease in farmer's income	3.13	.779	A
10	Liquidation of some food production enterprises	3.34	.679	A
11	Displacement of farm labour	3.14	.687	A
12	Downsizing of farm labour causing unemployment	3.06	.544	A
13	Decrease in food production outputs	2.95	.705	A

14	Hoarding of food by farmers	3.11	.482	A
15	Disruption of food production activities	3.09	.501	A

\bar{x} = mean, S = Standard deviation, A = Agreed, D = Disagreed, n = number of respondents

Quantitative data in Table 1 reveals that the mean scores of respondents for all the 15 items range from 2.95 to 3.41 which are above 2.50 on 4-point scale. This implies that respondents agreed to information represented by the items as impacts of COVID-19 on food production in rural areas of South-East Nigeria. These findings are agreement with qualitative data collected from farmers which reveal that the incidence of COVID-19 thwarted farming processes, restricted farmers’ movement and access to farm inputs, reduced farm labour and food outputs in rural areas of South-East Nigeria. One of the respondents stated that:

“...COVID-19 caused our income to reduce because our farming activities reduced, more so we were not getting enough supply of farm inputs because there were restrictions in movement. So we couldn’t move to the farm our usual ways...”

This statement implies that the incidence of COVID-19 caused a decrease in the supply of farm inputs to farmers, reduction of farming activities and farmers’ income and restriction in farmer’s movement. Another farmer reveals that:

“...the quantity of food we produced eventually reduced and some of us were reserving our foods for our families because we were scared of what the incidence of COVID-19 will lead to in the world...”

This statement clearly reveals that quantity produced by farmers reduced and some farmers hoarded foods for their family consumption because of the fear of unknown.

Research question 2: What are the impacts of COVID-19 on food distribution in rural areas of South-East Nigeria?

Impacts of COVID-19 on food distribution

Quantitative and qualitative data for answering research question 2 are presented below

Table 2: *Impacts of COVID-19 on Food Distribution in rural areas of South-East Nigeria*

S/N	Item statements	\bar{x}	S	Decision
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1	Decrease in the quantity of food supplied	3.40	.733	A
2	Increase in the prices of food	3.22	.598	A
3	Increase in the cost of transportation	3.28	.808	A
4	Restrictions in markets /trades	3.49	.670	A
5	Decrease in the demand for commercial food services	3.36	.726	A
6	Farmers discarded perishable produce at low price	3.21	.703	A
7	Displacement of customers	3.34	.733	A
8	Increase in demand for food	3.36	.726	A
9	Reduction in market share	3.15	.790	A
10	Decrease in food processing activities	3.41	.724	A

\bar{x} = mean, S = Standard deviation, A = Agreed, D = Disagreed, n = number of respondents

Quantitative data in Table 2 show that the mean responses of respondents for all the 10 items range from 3.15 to 3.49 which are above 2.50 on 4-point scale. This indicates that respondents agreed to information represented by the items as impacts of COVID-19 on food distribution in rural areas of South-East Nigeria.

Qualitatively, a farmer responded that:

“...the issue of corona virus was a turn in the flesh of farmers because some of us couldn’t go to market to sell our products especially to people who usually come from cities. Though people were hungry of what to eat, they did not have enough money to buy food because food became very costly. Some of our customers were nowhere to be found as some of them stopped businesses and travelled...”

This statement above clearly reveals that the impacts of COVID-19 on food distribution include restriction in markets, increase in the cost of food, increase in demand for food and displacement of customers. Also, other statement by farmers revealed that some perishable foods wasted; there were difficulties in processing foods and decrease in the quantity of food supplied by farmers.

Research question 3: What are the impacts of COVID-19 on food security in rural areas of South-East Nigeria?

Impacts of COVID-19 on food security

Quantitative and qualitative data for answering research question 3 are presented below

Table 3: *Impacts of COVID-19 on Food Security in Rural Areas of South-East Nigeria*

S/N	Item statements	\bar{x}	S	Decision
1	Food shortage or scarcity	3.35	.844	A
2	Unstable food supply	3.50	.509	A
3	Restricted access to food	3.19	.441	A
4	Poor utilization of food	3.30	.720	A

\bar{x} = mean, S = Standard deviation, A = Agreed, D = Disagreed, n = number of respondents

Quantitative data in Table 3 indicate that the mean responses of respondents for all the 4 items range from 3.19 to 3.50 which are above 2.50 on 4-point scale. This shows that respondents agreed to information represented by the items as impacts of COVID-19 on 4 pillars of food security in rural areas of South-East Nigeria.

A farmer in line with the findings above stated that:

“...a lot of the people became hungry; reason being that there was short of enough food supply...and people were caged and couldn’t move out to buy food...in fact most times food supply was not steady even when the government opened the market few times within the week...”

This evidently implied that there was increased level of hunger, inadequate and unsteady food supply and restricted access to food during the COVID-19 incidence. Another statement by one of the respondents revealed that:

“... a lot of perishable food wasted and food were poorly used because processing of food became a bit difficult when the table was tuned by the corona virus outbreak...”.

This statement is an indication of poor utilization of food which caused lots of wastage during the pandemic.

Research question 4: What are the impacts of COVID-19 on food safety in rural areas of South-East Nigeria?

Impacts of COVID-19 on food safety

Quantitative and qualitative data for answering research question 4 are presented below

Table 4: *Impacts of COVID-19 on Food Safety in Rural Areas of South-East Nigeria*

S/N	Item statements	\bar{x}	S	Decision
1	Vulnerability of food and food items to corona virus infection	3.20	.720	A
2	Change in dietary patterns of individuals	3.11	.720	A
3	Disruption of people's nutrition	3.37	.000	A

\bar{x} = mean, S = Standard deviation, A = Agreed, D = Disagreed, n = number of respondents

Quantitative data in Table 4 reveal that the mean scores of respondents for all the 3 items range from 3.11 to 3.37 which are above 2.50 on 4-point scale. This implies that respondents agreed to information represented by the items as impacts of COVID-19 on food safety in rural areas of South-East Nigeria.

Qualitatively, one of the respondents stated that:

"...so many persons became afraid to contract COVID-19, people were also mindful of how they handled items including food because they don't want to be infected with this disease....so our foods became a risk factor..."

This opinion above suggests that food and food items became risk factors of contracting COVID-19. This also implies that foods were no longer safe for people consume basically as a result of poor handling. Another respondent stated that:

"...our foods became an agent of transmitting COVID-19, more so peoples' diets changed because they could not get the usually foods they eat on regular basis, so they just manage what they see available..."

The statement above reveals also that food became unsafe because of corona virus and also the short supply of food cause changes in peoples' diet and hence nutrition.

Research Question 5: What are the possible coping strategies to the impacts of COVID-19 on food system, food security and food safety?

Possible Coping Strategies to the Impacts of COVID-19 on Food system, Food security and Food safety

Quantitative and qualitative data for answering research question 5 are presented below

Table 5: *Possible Coping Strategies to the Impacts of COVID-19 on Food system, Food Security and Food Safety in Rural Areas of South-East Nigeria*

S/N	Item statements	\bar{X}	S	Decision
1	Government, international organizations, philanthropists and banks should provide agricultural palliatives for farmers in form of seeds, seedlings, agrochemicals and other inputs	3.41	.700	A
2	Government, international organizations, philanthropists and banks should provide agricultural loans for farmers with little interest	3.46	1.042	A
3	Government, international organizations, philanthropists and banks should subsidize agricultural inputs for farmers	3.01	.711	A
4	Government, international organizations, philanthropists and banks should provide financial agricultural grants for farmers	3.33	.744	A
5	Adoption of effective e-agricultural marketing measures/support networks	2.82	.770	A
6	Adoption of e-agricultural extension education to provide agricultural information to farmers	3.09	.702	A
7	Promoting of food safety standards in handling, processing and preparation of food	2.88	.880	A
8	Providing farmers and individuals with health protective facilities such as face	3.37	.782	A

	shields, sanitizers, infrared thermometer, etc.			
9	Government should enact agricultural transformation policies/programmes to boost food production	3.61	.996	A
10	Strengthening trade to encourage food distribution	3.34	.625	A
11	Government, international organizations and philanthropists should provide palliative food items and individuals	3.34	.798	A
12	Enacting and adopting policies that will strengthen individuals' access to food	3.26	.823	A
13	Enacting and adopting policies that will strengthen individuals' income	2.92	.812	A
14	Ensuring farm health safety working conditions	3.15	.753	A

\bar{x} = mean, S = Standard deviation, A = Agreed, D = Disagreed, n = number of respondents

Quantitative data in Table 5 reveal that the mean scores of respondents for all the 3 items range from 2.82 to 3.61 which are above 2.50 on 4-point scale. This implies that respondents agreed to information represented by the items as possible coping strategies to the impacts of COVID-19 on food system, food security and food safety. One of the respondents during interview meeting stated that:

“Government other bodies should help the farmers in order to boost food production again in our part of the country. They should provide us with money because we lost a lot of money even our businesses during COVID-19 and stop politicizing giving of palliatives...They should provide us with things to protect our laborers from corona virus...They should also make sure that our markets are open so that we can be able to sell what we produce...”

This statement above support the findings from quantitative data collected which reveals that farmers agree that government, international organizations, philanthropists and banks should provide agricultural loans, grants, subsidies and

palliatives for farmers . The qualitative statement above also points out farmers should be provided with health protective facilities such as face shields, sanitizers, infrared thermometer, etc. This will keep farmers healthy for production.

Another statement by a respondent is that:

“...government should help to make agricultural programmes and policies that will boost food production in South-East Nigeria because all we have built for years have been disorganized by corona virus. Now we lack resources to produce foods and even take care of our families... Also farmers should be careful and make sure they adequately protect themselves and workers”

This implies that governments of South-East Nigeria should develop agricultural transformative policies that will help to boost food production that has been affected by the incidence of corona virus. More so, farmers should ensure they and workers are well protected against COVID-19.

Discussion of Major Findings

Quantitative and qualitative findings of the study revealed that the incidence of COVID-19 resulted to decrease in the supply of agricultural inputs, liquidation of some food production enterprises, restriction and scarcity of farm labour, exposed farm labour to health risk, decrease and disruption of farm production activities, increase in the cost of agricultural input, decrease in farmer's income and decrease in farm output among others in rural areas of South-East Nigeria. In line with the findings of this study, Emma et al. (2020), FAO (2019) and Terero (2020) identified that the incidence of COVID-19 led to a noticeable decrease in general food production. Also, Emma *et al.* (2020) pointed out that some farmers discarded some of their output in large quantities.

Also, the study found that COVID-19 affected food distribution in the following ways; there was reduction in supply of food, increase in the cost of transportation, restriction in markets/trades, increase in the demand for food without a corresponding supply, displacement of customers, decrease in the demand for commercial food services, among others. These findings are in agreement with other studies which reveal that as a result of the prevailing pandemic there was a decrease global food exchange, massive decrease in demand for commercial food services, restrictions in farm labour operations, processing capacity and storage and increase in prices of food and related items (Emma *et al.*, 2020; Iwelumo *et al.*, 2020; Terero, 2020; FAO, 2019).

The study also examined the specific impacts of COVID-19 on food security and found that there was food shortage or scarcity, unstable food supply, restricted access to food and poor utilization of food in rural areas of South-East Nigeria as a result of the pandemic. FAO (2019) in line with the study predicted that the incidence of COVID-19 will increase the rate of hunger and food insecurity globally. Capone *et al.* (2014) stated that food security in an area is evaluated under four basic pillars such as availability, access, utilization and stability of food. Hence the study investigated the impacts of COVID-19 in these specific areas.

It was found by the study that food and food items became vulnerable to corona virus infection, people's dietary patterns and nutrition changed because they fed on food available as they couldn't most of the foods they eat on regular basis. In agreement with these findings, FAO (2019) predicted that food safety will be comprised as a result of COVID-19. According to Australian Institute of Food Safety (2019), food Safety refers to handling, preparing and storing food in a way to best reduce the risk of individuals becoming sick from foodborne illnesses. . Researchers observed that many farmers and individuals in South-East Nigeria seem not to be handling, preparing and storing foods in the best way to prevent corona infection, hence food safety during the pandemic became an issue.

The study also 14 identified possible coping strategies to the impacts of COVID-19 on food system, food security and food safety. These include enactment of agricultural transformation programmes and policies to boost food system, food security and food safety, provision of loans, grants, subsidies and other palliatives for farmers by government, international organizations, philanthropists and banks, adoption of e-agricultural marketing and education with supporting networks, strengthening trade to encourage food distribution and ensuring farm health safety working conditions among others. In agreement with the findings of the, Shrikrushna *et al.* (2020) suggested the adoption of adaptive strategies and policy responses to food trade, postharvest food processing, food cost, food safety, stabilizing individuals' incomes and access to food, and ensuring continuities of food supply chain. Also, Iwulemo *et al.* (2020) recommended provision of more palliatives for farmers in the form of improved seedlings, basic farm implements at highly subsidized prices, and free or more affordable farm extension services. Iwulemo *et al.* further stated that the agricultural sector should be given more priority in budgetary allocations. More so, FAO (2019) in line with the findings of the study recommended food system transformation, reinforcement of global humanitarian responses, boosting smallholder resilience for recovery, bolstering

trade and food safety standards, economic inclusion and social protection to reduce poverty, improve data for decision making and preventing the next zoonotic pandemic through strengthened one health approach.

Conclusion

Undoubtedly, the incidence of COVID-19 poses a serious threat to the food system, food security and food safety in rural areas of South-East Nigeria. It eventually affected food production in that it led to decrease of farm outputs and supply of agricultural inputs, liquidation of some food production enterprises, restriction and scarcity of farm labour, increase in the cost of production, exposed farm labour to health risk, decrease and disruption of farm production activities, increase in the cost of agricultural input and decrease in farmer's income among others. Also, food distribution was affected as there was reduction in the supply of food/food items, increase in the cost of transportation, restriction in markets/trades, increase in the demand for food without a corresponding supply, displacement of customers, and decrease in the demand for commercial food services, among others.

Furthermore, the specific impacts of COVID-19 on food security include food shortage or scarcity, unstable food supply, restricted access of people to food and poor utilization of food. Evidently, food safety was also compromised by COVID-19 in that food and food items became vulnerable to corona virus infection, people's dietary patterns and nutrition changed because they fed on food available as they couldn't most of the foods they eat on regular basis. Hence, the need to adopt certain measures to reducing the impacts of COVID-19 on food system, food security and food safety in rural areas of South East Nigeria. Some possible coping strategies that could be adopted to curtailing the impacts of COVID-19 on food system, food security and food safety include enactment of agricultural transformation programmes and policies to boost food system, food security and food safety, provision of loans, grants, subsidies and other palliatives for farmers by government, international organizations, philanthropists and banks, adoption of e-agricultural marketing and education with provision of supporting networks, strengthening trade to encourage food distribution and ensuring farm health safety working conditions among others.

Recommendations

Researchers recommended the following based on the findings of the study.

- Government, international organizations, philanthropists and banks should provide farmers with seeds, seedlings, agrochemicals and other inputs, loans, subsidies and grants in order to boost food production in South-East Nigeria
- The governments of South-East Nigeria through the Ministry of Agriculture should develop and implement realistic and transformative agricultural policies and programmes to enhance food system, food security and safety in South-East Nigeria.

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