



Impact of COVID19 on Sudan Agriculture: The Role of Agricultural Extension During the Pandemic Era

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Abstract

Keywords:

COVID
Pandemic,
Impact, Food
Security, Sudan,
Agricultural
Extension

Agriculture is the backbone of the Sudan economy and represents the biggest industry of the country. The majority of Sudanese people live in rural areas and depend on agricultural production as the main source of their income and food security. This paper was prepared to study the impact of COVID19 on Sudan agricultural production and marketing in addition to the national policy response to mitigate this impact, and to study the role of agricultural extension to help farmers cope with the Covid19 pandemic era. This study was descriptive and mainly based on secondary data. The study showed that agricultural production and marketing in Sudan are affected by the impact of COVID-19 pandemic, and the country is also faced by desert locust problem that may cause considerable losses of both crop production and pasture and shortly along with the pandemic will lead to food insecurity in the country. The study also revealed that the government of Sudan has taken some measures to alleviate this situation and the agricultural extension has a key role to help farmers cope with the pandemic era. It can be concluded that agricultural production and marketing in Sudan are not outside the impact of COVID-19 and consequently Sudan food security was affected by the pandemic. The government of Sudan has taken some measures to alleviate this situation. The agricultural extension has a key role to help farmers cope with the pandemic era. In this study, the role of agricultural extension during the pandemic era was presented in detail and the necessary suggestions during the pandemic era were presented.

1. Introduction

The outbreaks of global pandemic diseases which emerge from time to time have a great impact on all aspects of human life. For instance, many different pandemic diseases has emerged during the past, such as the Spanish Flu, Asian Flu, Hong Kong Flu, HIV/AIDS, SARS, Ebola, and Swine Flu, caused a great impact on the economy, the environment, human activities such as livestock, agriculture, tourism, transport, education, health, fishing, mining, industry and commerce (Siche, 2020).

Currently, the world is facing new pandemic known as Coronavirus disease or COVID- 19. Now every country has undertaken special measures to fight against this new disease mostly with non-pharmaceutical measures involving social distancing and self-isolation in one side. In other side restriction in travel and trade are done in the majority of countries of the world to limit the spread of the virus. All these measures against this dangerous and fast

pandemic disease were affected negatively the major economic sectors such as agriculture which serves as the backbone of the economics of most developing countries (Poudel et al., 2020). Therefore any measure adopted should protect the health and food security of the population, and in the same time not affecting various economic activities.

COVID-19 pandemic is a health and humanitarian crisis threatening the food security and nutrition of millions of people around the world. Addressing the COVID impact requires all of us to work together across all sectors and local and international borders to mitigate the immediate impacts of the pandemic and to reshape food systems and support healthy diets for all people and increase food production and consumption aligned to sustainable development (UN, 2020). Markets and other related services, such as transport, are being affected by the pandemic.

Table 1. Major Pandemics from the 20th century

Pandemic	Time period	Causative Agent	Death Trol
Spanish Flu	1918-1919	H1N1 strain of influenza A virus	About 50 million
Asian Flu	1957-1958	H2N2 strain of influenza A virus	1.1 million
Hong Kung Flu	1968-1970	H3N2 strain of influenza A virus	1 million
HIV/AIDS	1981-Present	Human immunodeficiency virus	About 32 million (end 2018)
COVID-19	2019-Present	SARS-CoV-2	162,956 (21 April 2020)

Source: Poudel et al., (2020)

Farmers producing perishable products such as fruit and vegetable crops, in particular, are in an especially vulnerable position. Reduced labour mobility threatens to leave some high-value crops in the fields and without adequate storage will lead these products to become. Changes in market demand and consumer behaviour are observed in some countries (for example, increased demand for staples and canned food with longer shelf lives). As a consequence, there is a higher risk of food loss of fruits and vegetables brought about by COVID-19. This was reflected in lower incomes and money for smallholder farmers, which then negatively affects their household food security (FAO, 20a).

Services including training, coordination meetings, field visits, and pest monitoring and surveillance have also been disrupted during the pandemic. The support received through these services is crucial for farmers to continue their farming activities. However, reduced human mobility is still likely to affect support services in most countries. For instance, due to lower workforce numbers in public institutions, reduction of allocated state budget and travel limitations, monitoring of crop fields and of plant pests and diseases, which is already weak in many developing countries, will be negatively affected by the pandemic (FAO,2020b).

Agriculture is the backbone of Sudan's economy and represents the biggest industry of the country. The majority of Sudanese people live in rural areas and depend on agricultural production as the main source of their income and food security. According to Zavatta G (2014), FAO was estimated that more than 60% of the world population relies on agriculture for survival.

The Government of Sudan has taken measures to curb the spread of COVID-19 such as mobility restrictions, travel ban and business and market closure to control the rate of infection. All of which will have affected negatively all stages of agricultural production, food supply and distribution. The restrictions of COVID-19 was hinder the Sudanese farmer's especially small-scale farmers from their easy access to their farms, markets to sell their products and/or buy agricultural inputs. They faced a severe shortage in agricultural labour and consequently decrease in the cultivated land and the

amount of vegetables and fruits demanded for consumption and spikes in prices of farm inputs. Therefore agricultural extension and advisory services should play an important role at the frontline of the response to the pandemic in rural areas of Sudan to assist farmers to adapt to the emergency context within the government regulations, agricultural extension organizations need to rapidly change their policy and programmes accordingly.

Agricultural extension has been recently defined as "systems that facilitate the access of farmers, their organizations and other market actors to knowledge, information and technologies; facilitate their interaction with partners in research, education, agri-business, and other relevant institutions; and assist them to develop their own technical, organizational and management skills and practices" (Christoplos, 2010). In Sudan, agricultural extension services were started since 1959 as ministry-based agricultural extension services (known as National Agricultural Extension Administration at the federal level) after the Second World War as a part of American technical aid for developing countries. From that time to nowadays many development and structural changes were made to this administration. In the year (2004) its name was changed to the Administration of Extension and Technology Transfer. This administration has a branch in each State Ministry of Agriculture of the country and dominated the majority of organizations that provided agricultural extension services in the country (Abdel Rahman et al., 2016).

The agricultural extension services in Sudan were affected by the pandemic. Movement restrictions, social distancing, travel ban, lowering workforce numbers and other government regulations have negatively affected the important agricultural extension activities, the most important of which are the traditional agricultural extension teaching methods through which the extension messages are delivered to farmers that in turn, will affect all agricultural extension services. Therefore, urgent solutions must be found so that agricultural extension can do its job to help farmers to continue their production under these conditions

The main objective:

The main objective of this paper was to study the impact of COVID19 on Sudan agricultural production and marketing in addition to the national policy response to mitigate this impact.

Specific objective:

The specific objective of this paper was to study the role of agricultural extension to help farmers cope with the Covid19 pandemic era.

2. Materials and methods

This study was descriptive and mainly based on secondary data. The secondary data were collected from different published sources such as reports, web sites, journals, newspapers, and social media.

3. Results and discussion

3.1 Agricultural production, marketing and food security

Several African countries faced food prices spike due to COVID19 pandemic restrictions such as travel ban, market closure, and social distancing. In Zimbabwe, South Sudan, and Sudan, it particularly difficult for suppliers to get inputs such as seeds, fertilizers, pesticides, farm equipment and animal feed to farmers on time regarding the cultivation season. This may result in hindering the production including vegetable and staples crops such as rice, maize and millet (Blanke, 2020). Local trade disruptions due to COVID19, including restrictions on gatherings, limited movement of people between and within states and markets closure, were led to unstable food markets and increased the prices of basic goods in major urban centres across the country.

COVID-19 related containment measures have also impacted international trade for the Sudan. The export of livestock to Saudi Arabia and other Gulf countries, in particular, has been negatively affected by movement restrictions in those countries. Additionally, exports of vegetables, fruits and cash crops have been significantly limited and disrupted during pandemic era due to the extremely high costs of long transit, air and sea freight. This was reflected in large amounts of vegetables and fruit accumulating in areas of production, affecting the income of vegetable and fruit producers. The most vulnerable sections of the Sudan population whose income and livelihoods depend mainly on informal economic activities and daily labour wages have been most affected, to the extent that the majority are struggling to provide meals for their families due to their diminished purchasing power. Refugees, petty traders/small business owners, smallholder farmers,

and pastoralists as examples are particularly vulnerable (FAO, 2020c).

FAO report (2020b) showed that movement restrictions, social distancing, disruptions of markets and value chains, the accessibility of agricultural inputs are most likely to affect farmers' access to fields and markets in preparation for the 2020/2021 agricultural growing season. The report also mentioned that according to the context and the evolutions of the pandemic, there are several common risks, including planting affected by reduced access to inputs due to limited market access and reduced incomes; harvesting disrupted by lack of seasonal labour; transport to markets reduced due to movement restrictions; and markets themselves constrained by lockdowns, physical distancing and lower purchasing power. World Farmer's Organization report (2020) revealed that in many countries lock-down and borders' closure are strongly impacting farmers' access to agricultural input such as seeds, fertilizers and agrochemicals.

Due to markets closure, international border closure, social distancing and travel ban, Sudanese small scale farmers who represent the majority of farmers in the country, faced a severe shortage in agricultural labour and farm inputs during pandemic era such as seeds, fertilizers, pesticides and other farm inputs. The availability of agricultural labour can be seen as the backbone of the agricultural sector and can affect production at farm-level. Workers shortage is one of the major issues in the agricultural sector of Sudan. Where we find that the agricultural sectors depend on the min implementing most of the field activities due to the insufficient spread of agricultural mechanization in the country. The travel ban has resulted in a reduction in the number of workers required, especially seasonal workers in the vegetable and fruit sector. This reflected negatively on the amount of vegetables and fruits demanded for consumption in various parts of the country. Consequently, this situation was led to spikes in prices of farm inputs, decrease in cultivated area and the price of farm products was raised especially perishable commodities such as vegetable, fruits, milk, eggs, fish and meats, also constraining transport of goods to processing facilities and declining in the export of products and the purchasing power of citizens. There is growing evidence that small scale farmers will be unable to continue to purchase their farm inputs as they have seen their income drop due to reduced access to markets for selling their produce. The country is also faced by desert locust problem that has developed significantly since the end of 2019, and may cause considerable losses of both crop production and pasture of 2019/2020 agricultural growing season (FAO, 2020b).



Figure 1. Agricultural production in Sudan during COVID19, Source: (Social media, 2020)

3.2 National Policy Responses to Alleviate the Impact of COVID-19 on Food Supply And Demand

The COVID-19 pandemic is already directly affecting food systems through impacts on food supply and demand, and indirectly through decreases in purchasing power, the capacity to produce and distribute food, and the intensification of care tasks, all of which will have differentiated impacts and will more strongly affect the poor and vulnerable. While many governments have sought to keep food supply chains moving and ensure input flows in time for the reason, there is a growing risk that farmers will be unable to afford to purchase these inputs as they have seen their income drop due to reduced access to markets for their produce. This, in turn, would lead to reduced or no cultivation during the next season, resulting in further drops in their income and thus rises in their vulnerability, as well as less food availability in their communities and other parts of the country (FAO, 2020b).

The first countries affected by COVID-19 were put in place many policies as a response to insure continue of the supply of agricultural products, absorb surpluses and minimize the losses of perishable products of producers. In China, policies include promoting the “vegetable basket” policy and use mechanisms to coordinate the supply and distribution of vegetable crops during the COVID-19 pandemic. The policies also include public procurement and distribution (Zhang, 2020). E-commerce enterprises intended to intensify the purchases of agricultural products to sustain market demand for smallholder farmers and create mechanisms to support the sales of accumulated products (Zhu and Guo, 2020).

The COVID-19 pandemic response plan seeks to preserve the ability of the most vulnerable people to meet additional food consumption and other basic needs by maintaining their productive activities and ensuring access to social safety networks and humanitarian assistance. It also seeks to maintain the continuity of the supply chain for essential commodities, such as food and agricultural inputs, and essential nutritional commodities, including ready-to-use therapeutic foods for malnourished children (UN, 2020).

“Social protection programmes can protect food access by increasing purchasing power for those who need it or by directly providing food through government or community-based programmes. Ensuring access to a diverse healthy diet, in addition to staples, is important. There is also a need to substantially expand the capacity of community-based and facility-based programmes to address acute malnutrition and the coverage of social protection networks for nutrition (UN, 2020)”.

To reduce the negative effects of markets closure, international border closure, travel ban, and social distancing, which led to a scarcity of food supplies, an increase in their prices that may threaten food security for citizens. And to reduce the impact of corona virus on food insecurity in the areas affected by conflict, and among refugees in the Sudan, the government has taken some measures to alleviate this situation, such as allowing retailers to sell vegetables and fruits within residential areas and also allowing stores to continue to sell food products to their clients within residential. The government also decided to provide financial support to families and small-scale producers affected by these restrictions imposed to confront this pandemic.



Figure 2. Effect of COVID19 on Agricultural Market in Sudan, Source: (Social media, 2020)

3.3 The Role of Agricultural Extension to Help Farmers Cope With The Pandemic Era

One of the immediate priorities of agricultural extension organizations in a COVID-19 context will be to assist all farmers to adapt with COVID-19 impacts. The following is the role of agricultural extension organizations to help farmers cope with the pandemic era:

1. They Should strengthening capacities of extension officers for preparing and conducting suitable extension messages that should cover the farmer`s awareness about the pandemic:

This will help extension officers reduce the spread of OVID19 and in the same time ensuring that good support is given to farmers in terms of both production and adapt to government regulations FAO report (2020d) indicate that agricultural extension and advisory services systems play an indispensable role at the frontline of the response to the pandemic in rural areas. However, to adapt to the emergency context within the government regulations, agricultural extension service providers need to rapidly change their way of operating systems.

2. They should not rely on traditional agricultural extension teaching methods, especially extension group contact methods:

Public services supporting crop production, such as agricultural extension, and related support services including training, coordination meetings, field visits, and pest control have also been disrupted during the pandemic. The support received through these services is crucial for farmers to continue their farming activities sustainable. Reducing human mobility is likely to affect these support services in several countries (FAOa). Therefore agricultural extension should use modern extension teaching (contact) methods as a fast and effective alternative methods such as smart mobile phone, the agricultural extension web sites, e-platforms and social media.

3. They should provide farmers with agricultural farm inputs from agricultural extension offices with reasonable prices, taking into account social distancing:

During COVID 19 pandemic, all agricultural extension partners should find a safe way that will enable farmers to obtain their agricultural inputs for the next agricultural season so that their agricultural production will not be affected, and consequently, as a result, market demands and the food security of citizens will not be affected by covid19.

FAO (2020e) report mentioned that during the EVD epidemic and the food prices volatility, smallholder farmers were profoundly affected by the epidemic. Comprehensive support to these smallholder farmers was is the key element of the responses, which included financial measures,

promoting access to inputs and agricultural extension services service. Several governments around the world planned policies to support agriculture sector during COVID19 pandemic with measures including increased access to credit and providing seeds and fertilizers at subsidized prices (OXFAM, 2019).

4. They should assist farmers get financial support (loans/grants) from banks and other financial funds in their areas:

According to FAO (2020e) report the following can be considered to promote access to rural finance as part of the COVID-19 response:

1-Provide short-term stimulus packages that support sales, cash flow and working capital. Such measures help to maintain or increase cash flows and provide tax credits, cuts, deferrals and refunds:

2-Enhance access to finance by incentivizing the creation or extension of guarantee schemes for loans to smallholder producers, direct public lending and setting targets for financial institutions for lending to smallholder producers.

3-Providing grants, subsidized loans and tax incentives. Promoting inclusive investments on agriculture is also important. Lessons in this regard can be gleaned from the Global Agriculture and Food Security Programme (GAFSP), which was launched in 2010 to respond to the food price crisis with better and targeted investments in agriculture.

5. They should contact agricultural firms in each area to providefarmers with agricultural machinery to reduce theirdependence on agricultural workers:

Seasonality is one of the main factors influencing the demand for labour in the agricultural sector of Sudan throughout the agricultural season. The mitigation of shortage in agricultural labour needed for the whole season can be alleviated by encouraging farmers to rely on agricultural mechanization which will solve this problem during the pandemic and for the preparation for the next agricultural season.During the COVID-19 pandemic, scale-appropriate machinery has become even more important for mitigating labour shortages. Working to facilitate the availability of scale-appropriate machinery include the ability of farmers to buy, use the equipment, and also encouraging those who have their machinery to become entrepreneurial service providers who offer efficient and mechanized land preparation, planting, irrigation, harvesting and post-harvesting to other farmers on a reasonable prices for-service basis (Cimmyt, 2020).

6. They should work with agriculture products/inputs markets managers, local officials and related stakeholders to ensure the continuity opening of these markets and restrictions regarding the pandemic:

Supporting food processing, transport, marketing, storing with specific focus on vulnerable smallholder farmers and food workers is also an important mission. In Afghanistan, FAO has already initiated this in seventeen main markets across seven provinces through the development of specific checklists/guidelines on COVID-19-safe functioning of markets, sensitization and training of market managers on these coupled with the distribution of disinfectants, hygiene kits and COVID-19 personal protective equipment (PPE) for market stakeholders (loaders, cleaners, traders, vendors, customers, and such) (FAO, 2020b).

7. They should assist in providing animal health services in each area:

As recommended by FAO (2020f) agricultural extension organizations should communicate with suppliers firms (e.g. feed, consumables) and professional service providers (e.g. veterinarians, mechanics, milk collectors) to secure the availability of inputs and services. And also provide livestock farmers with the latest information on the evolving COVID-19 situation from trusted sources e.g. Official news releases, radio programmes provided by local governments, field livestock/veterinary officers, livestock market officers, livestock NGOs, veterinary pharmacies and farmers associations.

8. They should support Backyard gardens production to ensure further fresh food available for families:

This will assist to ensure production of further fresh food availability e.g. distribution of small stock, distribution of tools and seeds for home gardening, through re-programming existing projects. In Afghanistan, existing humanitarian and new projects are fast-tracking provision of backyard poultry packages especially to vulnerable women-headed households (FAO, 2020b).

9. They should assist farmers in improving their storage capacities and enhancing their opportunities in processing and conservation of their products which include fruits, vegetables, milk and meat products, etc.:

As mentioned by FAO (2020b) agricultural extension should seek to support food processing, transport, marketing storage specifically for vulnerable smallholder farmers and food workers. For example, in Bangladesh, FAO is already starting to support farmer's group associations and small and medium enterprises with mechanization and appropriate technology for post-harvest storage and processing to mitigate food losses, improve market access and quality.

10. They should assist farmers by facilitating the availability of transport vehicles and commercial

relationships inside the different market supply and demand chains:

This can be done through strengthening the availability of agricultural products in the market by providing transport vouchers and facilitating commercial relationships inside the different value chains (FAO, 2020b).

4. Conclusion and Recommendations

From this study, we concluded that agricultural production and marketing in Sudan are not outside the impact of COVID-19 and consequently Sudan food security was affected by the pandemic. The government of Sudan has taken some measures to alleviate this situation. The agricultural extension has a key role to help farmers cope with the pandemic era. In this study, the role of agricultural extension during the pandemic era was presented in detail and the necessary suggestions during the pandemic era were presented.

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